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AVIATION

The Oldest American Aeronautical Magazine

THE *Graf Zeppelin's* FLIGHT AROUND THE WORLD

By Captain Sir Hubert Wilkins

THE *Schneider Trophy Contest*

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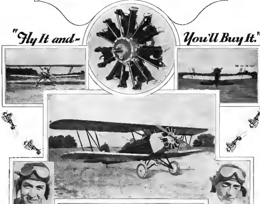

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AVIATION

The Oldest American Aeronautical Magazine

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The Police Commissioner Takes the Reins

THE HEAD of New York's police department who is never slow to seize upon a new idea, has decided to do something about aviation. To be specific, he suggests the formation of an aerial squad in the department, who will be mounted on amphibions instead of on motorcycles, and who will presumably evolve some form of aerial salute to replace the familiar "pull over to the curb."

It is easy to sympathize with Commissioner Whalen's agitation, coming as it does as the immediate consequence of two accidents in which innocent bystanders were killed by aircraft in the New York metropolitan area It is not so easy to agree with him upon the desirability of police department action of the sort that he suggests The idea is not new It has been broached repeatedly in the past, sometimes with serious intent and sometimes as a means of attracting public attention New York, in fact, had an air police reserve a number of years ago, all fitted out with beautiful natty uniforms, and other cities have toyed with the same scheme.

Reckless flying must not be tolerated Some authority must put a stop to it—but municipal police departments cannot do the job That simply will not work.

THE GOOD OLD DEBATE on State versus Federal control of flying was thrashed out over and over again from 1921 to 1926 The arguments in favor of Federal supremacy finally triumphed, and they remain as good today as they ever were Every objection to State intervention applies with redoubled force against the interference of the cities in the field of aerial law-making It is an axiom of American police administration that some of its most serious problems proceed from its being split up on state and municipal lines, and from the unwillingness of the criminal to remain in the jurisdiction in which he commits his offense When dealing with infractions of aerial law by vehicles which pass from one side of a city to the other in five or ten minutes of flight the difficulties become prohibitive.

Regulations must be on a national scale, if they are to be generally understood and generally observed Licensing must be solely on a national scale, if there is to be any air traffic at all Enforcement should be national so far as practicable.

Of course it is to be taken for granted that local authorities will co-operate in enforcement work State police especially and certain city police officers as well, ought to have enough understanding of the regulations to recognize apparent violators and look for the Department of Commerce registration numbers on the plane There should be no need for any special force for this work, however, and the same amount of money would be far better expended in increasing the scope of the Department of Commerce's activities

THE DEPARTMENT OF COMMERCE is always short of funds for carrying on regulation as required of it by law The interests of the aeronautical industry will be bound to suffer from unfavorable public reaction if the ground-dwelling populace does not feel that it is adequately protected against improper flying There are two vitally necessary steps in providing such protection First, the air regulations must be more generally understood, both by those who go into the air and by police and others who remain upon the ground There is frequent evidence that most municipal officials are entirely ignorant of their contents, while many are unaware of their very existence. Second, the Department of Commerce in its regulatory activities must be more liberally treated by the Bureau of the Budget and by Congress, or the department must be provided with some sort of revenue of its own These things come far ahead of Commissioner Whalen's amphibio-aerial traffic squad in importance in efficiency, and in probable economy

Edward T. Jones

THE AERONAUTICAL INDUSTRY has lost a leader who could ill be spared. The death of Edward T. Jones, chief engineer of the Wright Aeronautical Corporation, following a long illness, terminates the work of one of the most important of contributors to recent aircraft engine progress.

The aeronautical power-plant has had to depend upon a judicious mixture of theory and practice for its development. Mr. Jones came into the aeronautical field well fortified with theoretical background acquired during his studies and during his experience as a teacher at Cornell. He supplemented it with practical experience gained at McCook Field, and with an unfailing watchfulness alike for practical difficulties in the way of accomplishing the theoretically desirable and for barriers interposed by natural law in the way of adopting the superficially attractive solution. He never feared novelty, and the creation of the high-powered air-cooled Vee engine stands largely to his credit. His work deserves to be remembered, and he has an assured place in aeronautical history. His devotion to engineering science, and his interest in young men entering the engineering field, were attested when he provided in his will for a substantial bequest to the technical work of the university from which he had graduated.

Considerable as was the respect everywhere felt for Mr. Jones' technical attainment, it did not exceed the personal affection of those who knew him personally. They share his family's sorrow at his sadly premature death.

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Without Benefit of Publicity

A YEAR AGO this month a British sportsman, the Vicomte de Sibour, and his wife started from London on a little tour by airplane. In mid-July they returned to their home, having flown a small and low-powered plane some thirty thousand miles in the interval, and having touched four continents and about a score of countries.

The Vicomte and his wife were making no record. They were seeking to grant no interviews. They stopped where they pleased, for as long as they pleased. They laid down no special organization along their course. They were casual tourists on pleasure bent, and they were among the pioneers upon a trail which many will follow.

We comment upon this flight not as unique but as symbolic. What the Vicomte de Sibour did can be done by hundreds of others. Travel by air within the United States has become a commonplace. Only a few Americans, such as Captain E. E. Aldrin and the late Lawrence Sperry and J. Dalzell McKee, have made protracted international tours. There should be many more. The purchaser of a two-passenger plane with an 80 hp. engine who has made himself a sufficiently skillful pilot is made free of the air of the whole world. More of them should take full advantage of their opportunities. There have already been a good number of Europeans who have practiced far-flung aerial touring, like the pair who flew from London to the far East with a light plane, a suitcase, and a ukulele. American sportsmen in increasing numbers should do likewise.

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Meditations on the Schneider

THE SCHNEIDER RACE ends in a British triumph. Equally remarkable are the care devoted to the elimination of parasite resistance in the competing machines, the success in boosting the power of an engine already of high performance to more than double its rated power, and the smoothness with which the members of the team handled their meteoric craft. Whatever regret many Americans may feel that they were unable to be represented by a team and to prove the mettle of their own products and the quality of American piloting, there will be no lack of warmth in our congratulations to the British industry and to the Royal Air Force. They did the work given them, and did it with splendid success.

The completion of one Schneider race is always merely the starting point for discussion of the next. Newspaper reports after the recent race suggested the possibility that Italian competition might not continue. There has been no such intimation in official reports from Rome. Gen. Balbo has looked forward to more Schneider contests in the future, but there are many in aeronautical circles in England and in Italy, as there were many in America during the years of our own competition, who feel that the drain upon national resources both in time and money is excessive, and that any good opportunity of withdrawal from governmental participation should be welcomed. A widespread conviction that the burden of annual international speed competition had become excessive was responsible in 1927 for increasing the interval between races from one to two years, and the possibility of further fundamental changes in the conditions of competition will no doubt be broached at the next meeting of the F.A.I.

One thing is certain. The Schneider race can no longer be considered as simply a sporting event. It is too costly, and the preparation for it lays too great a load upon the industry, to permit of its being regarded in that aspect. The condition under which the race is to be continued, and also the desirability of competition by any particular country, must be determined primarily from the point of view of industrial and technical benefit likely to result. Where countries have abstained, as France has done for many years and as the United States did this year and in 1927, prestige may be in-

volved, but sportsmanship is not. The decision to remain out of the competition represents only an inability on the part of government officials to see where and how the necessary expenditure would repay itself.

It is interesting to note that whether there has been much racing going on or only a little, and whether many nations have been actively participating or very few, the rate of upward progress of the world's speed records has been almost constant for many years. From 60 m.p.h. in 1910 to 260 in 1923 and to 360 in 1929, advance has been made, with singularly little variation, at the rate of 30 m.p.h. every two years. We agree with views recently expressed by Secretary Davison that the speed of racing machines has risen more rapidly than has the ability to put what has been learned from racing into service in practical military and commercial airplanes. We do not believe that a reduction in the number of international competitions for speed would substantially retard the progress of the art. We hope that the F.A.I. will give serious consideration to a further increase in the interval between races to three or even four years.

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Census Time Is Coming

IT IS FASHIONABLE to say nowadays that business has become a science and a profession. The operations of business have attained the dignity of being taught in graduate schools. They are the object of the attentions of research foundations without number.

Research has found a place in the business world because the business man has recognized his dependence on accurately known facts. Waves of depression, overproduction, unemployment crises and other such unpleasant phenomena, whether in the airplane industry or elsewhere, can be controlled and prevented only if those with power to take action have complete, reliable, and up-to-the-minute data always at their fingertips. Among manifold debts that the business world owes to President Hoover, one of the greatest is due for his efforts in providing better and prompter commercial statistics. The Aeronautics Branch of the Department of Commerce carries on nobly in the tradition that he set.

The Aeronautics Branch does what it can with the information available, but the aircraft industry still suffers a dearth of information upon its own operations and their trend. The aircraft industry, at least as much as any other, ought to welcome the forthcoming Census of Manufactures and the attempts that are on foot to make it more complete than any of its predecessors.

The manufacturing census that is about to be taken will be unique. The plans for taking it and for analyzing the information gained will be examined and approved at every point by a committee of business men under the chairmanship of Leonard S. Horner of Connecticut, a well-known figure in the aeronautical world. Schedules of inquiry and methods of treatment will be separately developed for each industry. The committee is convinced that the census can yield results of the utmost practical value to business men if all manufacturers will wholeheartedly cooperate. The aircraft industry ought to lead the way.

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Gas and Oil Service

AS WE HAVE WATCHED the growth, particularly through the Pacific States, of vast chains of magnificent highway service stations for the service of automotive vehicles, we have enviously wished that they might serve as an example to the many aviation fields now offering only meager fueling facilities, and no facilities whatever in the way of wash rooms, telephones, or restaurants. How welcome it would be to taxi up to a sheltered fueling station and find a uniformed attendant ready to refuel and lubricate the plane while the pilot adjourned to comfortable rest rooms or an adjoining lunch room.

Of course air traffic is not yet sufficiently heavy at most fields to warrant the installation of such equipment and the placing of attendants purely for the servicing of aircraft. Perhaps, however, a combination plan could be worked out by which service stations designed to serve both visiting automotive parties and visiting airplane parties could be erected and operated with profit. They would attract both ground and air traffic, and should materially aid in building up the latter. Certainly the present condition at many fields where facilities consist of one empty hangar and little more is highly unsatisfactory.

One western company has erected a chain of about 50 service stations located along the Pacific Highway stretching from Canada to Mexico through the states of Washington, Oregon, and California. They are on the main highway, and are equipped with the most complete facilities for automobile servicing. Several of the stations are located on established airports and all are near good emergency landing fields. Each station is marked by a 150 ft. beacon tower with a rotating beacon light at the top and the name of the oil company extending vertically down the tower in large red neon letters visible for many miles at night. In future they are to be developed so that all will incorporate an adjacent landing field, with complete hotel and terminal facilities for both highway and air traffic.

The development of field service facilities is one of the most vital problems in connection with the growth of aviation. Those companies which expect to reap the profits of the future must be willing to lead in the pioneering of such facilities as will greatly encourage aircraft owners to travel more widely over the air routes, both by day and by night.

SOME ASPECTS OF THE *Graf Zeppelin's* FLIGHT AROUND THE WORLD

By Captain Sir Hubert Wilkins
With Permission of the Hearst Newspapers

THE HEARST-ZEPPELIN globe encircling flight established several records not likely to be broken for some time to come. The airship was not designed or built to engage in speed contests, but its record flight from Lakehurst to Friedrichshafen compares so favorably with other records that even the officers on board were astounded.

The official time in the air between Lakehurst and Friedrichshafen is 55 hours 22 min., and 46 hours 52 min. from New York to Paris. Lindbergh's time was 33½ hours, and Byrd took 43 hours 21 min. from New York to the French coast.

But those of us who take part on these flights know that official time in the air and between points is not always a criterion of the performance of the machine or its navigators. Conditions vary so much that each flight must be considered on its own merit, and a comparison of time alone does not give one an accurate idea of the performance.

The circumstances on several sections of our round the world flight were favorable for making record time in an airship, and while Dr. Eckener has the best weather sense that I have observed in any man, we had exceptional weather to work in. Although the actual eastward journey was covered in such a short space of time the airspeed of the Zeppelin did not exceed that made during the flight from Friedrichshafen to Lakehurst, when the journey took some 82 hours.

Throughout the world flight the air speed of the airship rarely if ever exceeded 70 m.p.h. The average for the whole journey was not much more than 50. So, while the elapsed time for the first leg compares not unfavorably with airplane time we cannot lose sight of the fact that there is a great difference of speed between lighter and heavier-than-air craft. The advantage of the airship therefore is the facility to operate in bad conditions, and the conveniences it affords for navigation. Airships today have considerable advantages over airplanes in the matter of navigation, but it is only reasonable to suppose that when larger airplanes with expert navigators on board do long-distance flights they will be able to take advantage of the weather as airships do today. This will speed up their time of travel in proportion to the difference of airspeed between the vehicles. Notwithstanding the great facilities for navigation and the many instruments, including drift indicators, special bubble sextants, a gyro compass, and a machine on board the Graf Zeppelin, for plotting position lines, the navigation of the world flight was not an easy matter.

It takes considerable experience to make use of the weather reports even when they are obtainable, and the information received on board the Graf was, in most cases meager. There is really no need to be at such a disadvantage, and it is one that should be eliminated as quickly as possible. It is easy enough to get a compiled weather chart from one of our friends at the meteorological office in Washington or New York, but quite a different matter to get information on board fast-moving aircraft, and so be in a position to know where there are good conditions of which one can take advantage.

On our flight over the Atlantic starting Aug. 8 Dr. Eckener had few reports, but in spite of this, and low visibility, he was able to take advantage of winds that increased our ground speed at times to 112 m.p.h. That meant at least a 42 m.p.h. tail wind. It is easy to imagine what might have happened had we been coming the other way and unable to avoid the wind.

Therefore I think the great lesson that has been again brought conspicuously to our notice as a result of the Zeppelin round-the-world flight is, that we must thoroughly develop the meteorological services of the world and arrange for greater co-operation.


The Islands of Japan slip by as the Graf heads out over the Pacific

An interesting observation made on the trip was that the Zeppelin could safely fly low, and for perhaps more than 50 per cent of the way we flew at an altitude less than seven hundred feet above sea level. At times we were only 300-400 ft. above the ground or the sea, and the highest altitude reached was not more than 5,000 ft. This notwithstanding the fact that we were at times between mountains 6,000-7,000 ft. high.


The author and Dr. Eckener "talking it over" in the control room of the Graf Zeppelin

While I am dealing with measurements I might draw attention to the fact that the lowest temperature recorded was not over the high altitudes of Siberia, but on the way from Chicago to New York. The minimum thermometer read 42 deg. F. over Siberia, 41 deg. when we were in the neighborhood of San Francisco, and a little less than 40 deg. when approaching New York. During that night was the only time we wished we had extra blankets. As a matter of fact I was too cold to sleep, and some time in the early morning got up, put on my overcoat, and got into bed again. Such conditions were to be expected at this time of the year, but most people know that the Siberian area over which we crossed is, in winter, the coldest place on earth. It is ever so much colder than at the North or South Pole, where temperatures seldom go lower than 60 or 70 deg. below zero. In Siberia a temperature of 90 deg. below zero Fahrenheit has been registered. Temperature means a great deal more to an airship than it does to an airplane. Within reason, low temperatures are better to fly in. One can carry more gas, the air is less turbulent, and with really low temperatures there is usually good visibility.

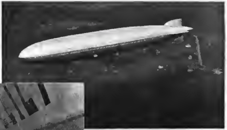
However, visibility is not such an important factor for an airship as it is for an airplane on long-distance flights. Many times during the Graf Zeppelin trip Dr. Eckener flew for preference in the rain and fog. On the trip over the Atlantic we got into a wet blanket of cloud, and water dribbling down the sides of the ship streamed along its bottom and dropped in miniature falls. The total amount of water on the envelope must have been considerable, and the actual force of the rain beating down a consideration that must not be lost sight of. Yet Dr. Eckener assured me that even in the heaviest rain we passed through it was necessary to increase the angle of attack only one degree to compensate by aerodynamic lift for the effect of rain on the ship.

WHEN CROSSING the Pacific we flew for hours in a heavy rain storm. The water just poured from the sides of the envelope. It beat up beneath the floor of the control room and the place was flooded. The wind was on our beam and the rain slanted down. That was the only time on the trip when rain came on the windows or into the control room; otherwise the great bulk of the envelope sheltered the living quarters. In thick haze and very foggy weather the windows clouded over, but that did not trouble the pilots at all. The officer of the watch made use of his time by keeping a lookout—the helmsman and the man at the elevator control steered entirely by instruments. Apart from the few times when we were in very turbulent air we were seldom more than 1 deg. from the course laid down. That would have been impossible in most airplanes available today, but the time will come when large heavier-than-air machines will be flown by an officer on watch and a helmsman who

will do nothing else but steer by his instruments after he is in the air, and until he is about to make a landing.

The Graf Zeppelin besides having six navigating officers, carried several aids to navigation that cannot well be carried by a heavier-than-air machine. The greatest aid was the gyro compass. This instrument was installed just before leaving Friedrichshafen on the round-the-world flight. It was not available on our first attempt, when the engines went wrong in the Rhone Valley in May of this year. On that flight the steering of the airship was very erratic, and I was dismayed at the irregular course we kept. Most airplane pilots could have steered a much straighter course. The difficulty was partly due, I understand, to the particular construction of the Graf Zeppelin. She was built to fit the only hangar available rather than with the idea of conforming to the best aspect ratio and steering qualities known.

The diameter of the ship was controlled by the size of the hangar, and it was necessary to include two parallel sections in the hull design in order to provide room for the power-gas cells. That feature in the Graf Zeppelin makes it particularly hard to control. However, the gyro compass and a vernier compass card with an 11 in. face which is set before the rudder man helped matters considerably, and the course on the round-the-world flight was exceptionally good. No such weight in instruments as that of even the most up-to-date gyro can be economically carried on an airplane, but there is a possibility of a lighter effective gyro compass being developed.



Right: An air shot of the Graf Zeppelin over Germany

Below: The Graf passing over the coast of Palestine on its Holy Land flight

The elevator man on the Graf Zeppelin has the aid of large inclinometers, gas gages, air pressure gages, etc., and normally a constant altitude can be maintained. There were times when line squalls or rapid changes in wind direction were so sudden that in spite of the efforts of the man at the controls, the Zeppelin would climb or fall at an angle of 18 or 20 deg., but most often the angle would not exceed 10 or 15 deg. Once when over Siberia, and again over the Pacific ocean soon after leaving Japan, we lost or gained about 600 ft. in altitude in one maneuver, in spite of the efforts of the crew to keep us on an even keel. These movements in an airship are slow as compared to "bumps" in an airplane, and because of the necessity to relieve the strain on the structure it is not advisable to pull an airship out of a dive as quickly as one might pull an airplane. The airship pivots about its nose, and heavy elevator control in violent wind changes would set up a great deal of leverage within the airship itself.

I AM TOLD that the Shenandoah was designed to withstand the vertical thrust of a wind of 12 m.p.h. The Graf Zeppelin is designed to withstand 15 m.p.h., but the two new ships now being built in England are designed to withstand a 50 m.p.h. pressure.

After leaving New York at the start of the flight, we

The Graf coming into the mooring mast at Mines Field, Los Angeles, after having crossed the Pacific

flew almost due east for a thousand miles in order to get south of a storm centered in Hudson's Bay. There were other disturbances east of Greenland and northeast of Iceland and beneath these, in the North Atlantic, a big movement of air circulating with its northern edge traveling in the direction we wanted to go. This great body of air moving toward the continent naturally produced low visibility as we approached the English coast, but conditions after we were a few miles inland were clear and afforded a glorious view of Paris. Our best course was about 100 miles south of the city, but Dr. Eckener decided to pass over it and thus added many minutes to the time of flight.

At Friedrichshafen the engineers, mechanics, balloon men and riggers were able to go over the whole Zeppelin structure with the utmost care. The engines had run well and on the actual trip in the air the total repairs amounted to one spark-plug change and one broken valve spring replaced. Such was the advantage of the multi-engined lighter-than-air craft that few, except the officers on watch, knew that an engine had been stopped. There was little to be done to the engines at Friedrichshafen. After a general top overhaul three more valves were changed and a few spark plugs renewed. The engines had by that time done more than 250 hours. There seemed to be no likelihood of the trouble that we experienced in the Rhone Valley developing again and we felt certain that the engines would give very little trouble on the long flight.

There was some little work to be done to the outer covering of the ship. The fabric on three sections of the tail and two on the bow were very loose. These had to be unlaced and tightened. Other sections showed a tendency to loosen, and these were attended to by the installation of some light reefing frames set longitudinally in several bays of the ship. As a matter of fact some of the frames had been installed when the ship was at Lakehurst but many more were put in at Friedrichshafen. In the latest rigid airship designs these bars are installed on eccentric bearings so that they can be turned to stretch or loosen the fabric without great difficulty and without the trouble of ripping of the covering strips and replacing the cover. Two other small jobs were required after the first stop. One was to mount a much bigger buffer bag and include a flotation gear, which also acted as a buffer, under the control car. This was as a precaution against hard landings in Japan and Los Angeles. The other job was of a more scientific nature. It was an improvement to the echo-lot, an instrument that electrically records the actual height above earth or water by acoustic means. This instrument is believed to be accurate within one per cent up to 600 ft. and is a great aid when travelling through fog or over long stretches of unknown mountainous country. It is practically independent of barometric pressure, and can be used to correct the altimeter for that condition at all times. Once when over the Pacific I remember Captain Lehmann took a reading with the echo-lot which showed our altitude to be 200 m. The altimeter, set only a few hours before, read 300 m. One hundred meters, or more than 300 ft., means a lot when flying low in a fog.

ALTHOUGH the Zeppelin can fly in almost all kinds of weather Dr. Eckener is too wise to start out in adverse conditions, and so the start from Friedrichshafen was delayed for 24 hours. We could get only meager data about Eastern Russia and Siberia, but that was partly due to lack of organization. The Russians have several stations on the Arctic coast, and useful information might have been secured from them. But even with information from all established stations there would not have been a comprehensive picture of conditions presented, and many more weather stations are needed before high latitude flying can be successfully carried out.

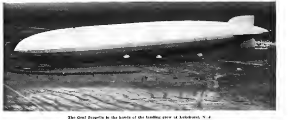
Not only more meteorological stations are wanted, but more cooperation and organization is needed. When over

Germany, between Friedrichshafen and Berlin we came to unexpected meteorological conditions, and I was surprised to hear Dr. Eckener say "I expected the wind about here to be in our favor. It is not as the reports indicate." But in general throughout the journey Dr. Eckener's estimate of the weather was correct. From information received he knew that it would be difficult to follow the urgent request of the Soviet Republic and cross over Moscow. His own great desire—as it was mine—was to fly at high altitudes over the Arctic sea. But notwithstanding his desire to go north and the Russian wish that he go south, Dr. Eckener chose a middle route. Where the wind is strongest in his favor, there you will find Dr. Eckener.

After leaving Friedrichshafen we flew north to Berlin, using as usual the heavy gasoline fuel for the first few hours then changing over to the gaseous fuel. The change-over is effected without even stopping the engine. All that is necessary is to turn off the gasoline supply and open a check valve. There is scarcely any difference in the sound of the engines when the fuel is changed. After Berlin we passed over Stettin, Danzig, out over the Baltic, slipped over the corner of Latvia and Esthonia and on into Russia. It was late at night when we crossed the border, and the first Russian town we saw was Wologda. It is a city of churches where I counted 40-odd spires. The Soviet representative informed us that these churches are now used as schools. Our route took us over the low part of the Ural mountains. Their height at that point is not over 2,000 ft. They were not in themselves a very great obstacle, but the many forest fires burning in that region almost blinded us with smoke, and made it difficult to keep the course. Generally the ground could be seen, but flying as we were away from the setting sun, the visibility was poor. Beyond the Urals we met with swamp lands and although I have seen the Barren Grounds of the Arctic, I think there is nothing more desolate in appearance than a general view of those Siberian swamps. They are probably frozen solid for six months of the year, and in that condition would afford a good surface for travelling on foot, but it would be almost impossible to walk through them in summer time. Notwithstanding the broad desolate appearance, a close observation showed more signs of animal life and more birds in that region than at any other part of the journey. We flew low over the ground most of the night. It was the weirdest sight I have ever seen. It was a job to tear oneself away from the window and snatch a few hours sleep, but that was advisable because, fascinating as the night view might be I could really see more of interest in daylight. At dawn I went again to the control room and found Mr. Leeds steering the ship. He was making a very good job of it. He had been up all night and told me that in about a 500-mile stretch they had seen but one small light, the only evidence of habitation.

The wind was in our favor. It carried us across the swamps and the few rolling hills that were covered with low, stunted, coniferous timber with such speed that we reached Yakutsk, 4,000 miles from our starting point, in 67 hours. The estimated air distance covered was 4,800 miles and that with only four engines running. Our air speed was probably never more than 60 m.p.h. and often less than 50. We averaged a 20 m.p.h. tail wind.

One of the great thrills of the journey was when we ran beneath a great rain cloud in Central Siberia. There were heavy rain squalls all about us, and most of them could be dodged, but at last one had to be flown through. As we passed beneath the cloud we were sucked up as if by a living force and enveloped in the dark gray base of the cloud. On the other side we were spat out with a downward motion and lost nearly 500 ft. in a few seconds. Another thrill was the approach to the Stanova Mountains—that great range fringing the Okhotsk Sea. They were marked on the maps as 3,400 ft. high, but even flying at 5,000 ft. we were beneath the level of the peaks. Under the guidance of Dr. Eckener, the crew steered the Zeppelin through this mountain range as a pursuit pilot might steer his machine. We followed the ravines and the gorges, many feet beneath the mountain tops and only a few feet above the ground. Many thought we were in grave danger and wondered why we did not fly higher and over the mountain tops. But as the ship was so light by that time, and as it was always possible to spill ballast quickly, Dr. Eckener, with his experience accumulated in 3,000 flights, knew he was safe. It was an amazing experience to hurtle down from 5,000 ft. over Asia to the edge of the Pacific Ocean, and as we did, we met with cloud and less favorable conditions. We had been notified of a cyclone in the neighborhood and most every one would have decided to steer clear



The Graf Zeppelin in the hands of the landing crew at Lakehurst, N. J.

A group of passengers about to be served a meal aboard the Graf

of it, but not our experienced German friends. If there is a tail wind anywhere they will be into it, even though it may be the dangerous end of a storm. The Graf's pilots knew just how far they could go with safety, and they took advantage of the storm. It is, however, a game that most had better not play, at least not until we are better provided with information as to the extent of the area involved and more certain of the behavior of our instruments. We had advantage of the storm for only a few hours. It hurried us down toward Japan and into a slight head wind. The wind was not strong and in a few hours we had completed the first non-stop flight from beyond the Baltic to the Pacific. The total distance from Friedrichshafen to Kasumigaura by the route we took is 6,980 miles, it was covered in 101 hours 44 min., and we still had enough fuel left to go half as far again. That was because we were able to fly on four engines most of the way—using the fifth only when bucking head winds, and because of the tail winds which had helped us so materially.

The Japanese Navy gave us a fine exhibition of skill and training. I have never seen men jump quicker to fulfill a command than did those Japanese boys.

A record of the furious round of entertainment showered upon us at Tokio has no place in an aviation journal, except perhaps to warn those who do pioneering things that they must remember that the entertainments are likely to interfere with schedules and that it is almost impossible, without insult, to avoid them. However, with such a big crew as we had on the Zeppelin there was no difficulty in maintaining the schedule, and promptly at the hour arranged we were moving out of the hangar. At that time we experienced the first slight damage sustained on the trip. It was caused by a jam in the runways carrying the trolleys that guided the airship, and aided, perhaps, by the fact that the guy ropes were made tight fast instead of being ready for quick slackening. When the order came to lift the car of the ship over an obstruction the men at the lifting bars could not budge the ship. The rear engine nacelle struck the ground, and several bracing wires and some struts were broken. It might easily have been a serious accident, and some of the main girders might have been strained. But again Zeppelin engineering proved to be adequate. The guy wires broke before doing any great damage to the main structure, and repairs were quickly effected.

Had we started that night we might have had fine weather, but it is unlikely that conditions would have been more favorable than they were when we actually started. Dr. Eckener has the reputation of smelling out the weather, but the weather seems to have the habit of favoring Eckener. Two days after he had planned to start we had to face only one small storm, and would then have good going the rest of the way—that is, good going for an airship. We approached the storm late in the evening. It looked like a real snorter, and one that most pilots would have avoided. The Zeppelin's officers gauged the storm and decided to tackle it. They knew they would have to go through it from "behind" that is, meet the downward thrust of aircurrent as we approached the cloud, and the helmsmen were warned. Even so we dipped steeply enough to alarm some of the passengers, and they flocked to the windows. The black cloud overhead shadowed and darkened everything. For a few minutes we rumbled along as if crossing a series of corrugations, and then at the other side of the cloud shot upward into an air stream traveling in an entirely different direction.

With the special drift indicator invented by the crew of the Zeppelin, they easily picked up the new drift reading and took up the course. The drift indicator generally relied upon during our flight (although the ship carried two of the usual circular bomb-sight type) was in reality a reflex camera. The lens pointing down threw a reflection on the ground glass of the instrument, and it was an easy matter to swing the glass so that objects passed along the ruled lines upon it. The glass holder was scribed in degrees and the angle read directly from the mounting. This form of instrument was found to be exceptionally serviceable for oversea operation, and it is the best of its type that I have seen.

For hours during the Pacific Flight we flew through thick fog where the visibility was not more than a few yards. However, through most of the daylight hours we could see the light of the blue sky above and knew that by going a few thousand feet up we could have been in clear sunshine. Many times the ship did rise above the clouds for a sun observation, and so a fix on our position was obtained. At other times we would descend to within three or four hundred feet from the sea and get an idea of the angle of drift and ground speed. The remarkable thing was that the wind was of the same strength above, below, and in the fog. It was frequently

found that the ground speed had been the same throughout hours of fog flying as it was when we were beneath it taking an observation This does not apply at all times and could not be depended upon in another flight

WHILE FLYING in such conditions as we flew might have been difficult or almost impossible for an airplane, it would have been possible, on the day we crossed, for an airplane to have flown either beneath the cloud, depending on the compass for direction, or well above the clouds—the tops of which were not above 4,000 ft.—checking the course by sun observation A trip by aircraft across that part of the Pacific is not by any means an easy undertaking, but in spite of so much blind flying we found that our estimated position, just before sighting

The control room of the "round the world" Graf Zeppelin

the Farrallones, near San Francisco, was only 8 miles from that certified by a passing steamer. That was remarkable when you consider that when crossing the Atlantic we were out more than 100 miles in our estimated position after 16 hours without a sight In that case the distance had been underestimated The direction was approximately correct

The total time of crossing from Kasumigaura to the Golden Gate was 68 hours 51 min, the total distance being 5,400 land miles At times our ground speed had been about 120 m.p.h, although our air speed probably did not average more than 60 The highest altitude we had to go to clear cloud was 4000 ft and the lowest temperature experienced, 41 deg F, was when we were leaving San Francisco for Los Angeles

One of the most impressive sights on the whole trip was the many airplanes circling above us, and San Francisco, Oakland and Berkeley beneath Another thrill was Los Angeles with its millions of lights and the little Goodyear Blimp tailing us up as we came in to land

Nothing could have been more efficient and workmanlike than the service given by the Navy and the officials at Mines Field Great credit is due to the men in charge of the organization The mooring mast looked a weak affair at the nose of the tremendous gas bag, but its engineering design and its construction were all that was needed The mooring operations were skillfully carried out It was when leaving Los Angeles that we apprehended the greatest danger We could see that the ship was heavy and those of us who have flown in low latitudes knew that we would get an unfavorable inversion of air temperature nearer the ground than we would expect at higher latitudes

With the aid of a mighty push from the ground-crew we lifted slowly, but it took the full power of all four engines (the rear engine nacelle is not occupied and the engine not used as a matter of precaution and safety for the crew when the Zeppelin takes off) to give us speed and the advantage of aerodynamic lift The airship had been walked from the mooring mast toward the end of the field, much closer than most of us expected The need for engine power and speed to enable us to rise soon ate up the distance to the end of the field, and as the nose of the ship was over the high tension wires we could feel the rudder dragging along the ground. Our heads stuck out of the window scarcely further than our eyes from our heads. We watched for the wires to go down and waited for the huge envelope to be caught by the tail and be tipped on its nose By a miracle, almost, the lowest part cleared the wires and we were away.

We had at that moment a chance to see the ship's personnel and others under high nervous strain—it was the only time when they were really disturbed It took some time for the excited comment to die down and for grayed faces to resume their natural color.

By going south and following the railway line the navigation with the aid of the excellent strip maps provided by the Department of Commerce, was simple, but the air conditions experienced over Arizona were the worst, both Dr Eckener and Captain Lehmann said, that they had ever experienced over so long a period For 4 hours we were tossed so much that it was suggested that we eat our meals standing, but before lunch time came we were over New Mexico and the air was smoother.

There is no need in this article to describe the conditions as we saw them over the United States, and it is now official history that we made the journey of 2,940 miles in 51 hours 13 minutes

The total time for the hop, skip and a couple of jumps round the world, over twelve different countries and thirteen states of the U S A. was 21 days 7 hours, 34 minutes

NO ACCURATE DETAILS of the fuel and oil consumption are available at present and it is doubtful if they are of very great importance It is an easy matter to work out the actual consumption that would take place when flying over the whole distance intended to travel and not counting on the aid of the wind It would be foolish to start out on any trip without a considerable margin, or, in fact, without all the fuel that the airship could reasonably carry Taking into account the help given by the various navies and civil powers, it would be difficult to estimate the actual cost of the Hearst-Zeppelin round the world flight, but it is said that the operating cost of the Zeppelin is about $5000 a day.

The flight was a wonderful experience and one that cannot be duplicated It was a pioneering job There are still many routes to pioneer both with airships and airplanes, and so long as we have Eckeners and the type of men who made up the Graf Zeppelin's crew, many of the new routes will be covered even in our day

I think it is clear that for long distance, oversea commercial transportation the airship has the advantage over the airplane, and we may look forward to the establishment of commercial airship routes in the near future.

Engine Service

FROM COAST TO COAST

By R. Sidney Bowen, Jr.

FULLY REALIZING that increased sales are best attained by giving 100 per cent service to the consumer, the Kinner Airplane and Motor Corporation of Glendale, Calif., manufacturer of the Kinner K-5 100 hp aircooled radial engine, is now establishing a service organization which will place every Kinner powered plane in the country within easy access of expert service And, not only that, but expert Kinner service day and night

When an airplane is purchased, both the plane manufacturer and the engine manufacturer are morally responsible for the satisfactory functioning of the combination as long as it is in use. The Kinner Airplane and Motor Corporation, Glendale, Calif., accepts full responsibility for the efficient operation of its product, and is now building up a coast-to-coast service organization that will place every Kinner engined plane within easy reach of expert Kinner service at all times

The arrangement, which has been worked out by R Ernest Tucker, sales and service manager, in co-operation with other officials of the Kinner company, calls for the establishment of Service and Parts Depots at strategic points throughout the country Four have been established thus far and are located at Wichita, Buffalo and New York the Kinner factory itself being the service depot for the Los Angeles area Each service depot carries a complete stock of Kinner parts and is a separate unit in itself That is each service depot buys its stock from the factory at a regular discount and conducts its own business as though it were an independent parts distributor Of course it is to be understood that each service depot is directly responsible to the Glendale office and subject to its methods and policies

HOWEVER, the point to be borne in mind is that each service depot must stand on its own feet There is a manager and assistant manager for each depot, and a territory to be covered They are also authorized to appoint Kinner service stations throughout their territories and the factory discount allowed them is of sufficient size to permit them to allow the service stations they appoint, regular discounts and still make a profit

In establishing the service depots an intensive study was first made of the location of planes powered with Kinner engines, and also of the location of factories manufacturing planes powered with the Kinner engine Due to the fact that the plane purchasers will naturally turn to the plane manufacturer for service, it was decided to establish the service depots near the factories producing Kinner powered planes

Incidentally, in each service depot are men who have been trained at the Kinner factory at Glenndale, and who are experts on the Kinner product By taking such precautionary measures the possibility of inexperienced service at a Kinner service depot is eliminated entirely

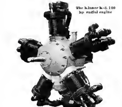
The work of setting up, or appointing, local service stations is being accomplished by a country-wide survey of Kinner powered planes Whenever a manufacturer sells a plane powered with a Kinner engine the name and address of the owner is immediately obtained by the Kinner company In that way, and also by checking up on past sales the company is able to determine the approximate location of its engines in service Then the service depots are acquainted with the names and location of Kinner owners in their territories, and local service stations are established accordingly

In addition to the service and parts depots, the Kinner company has gone even further in its efforts to give its customers full service value It was found that there were many centers of flying activity that did not justify the establishing of a service and parts depot yet they did justify more attention than could be afforded by a local service station To complete that part of the picture, field service representatives were appointed Theirs is a roving commission in that they travel all over the

countryside contacting the manufacturers, the local service stations, and if necessary the engine owners They are responsible direct to the Glendale office and acquaint that office with their movements from day to day In Mr. Tucker's office there hangs a map of the United States and on its surface one can note a collection of colored pins stuck into the map at various places One color represents the location of the service and parts depots, another color represents the location of local service stations And still a third color shows the up-to-the-minute location of the field service representatives.

Thus, if the factory receives an emergency call from a plane manufacturer, or a plane owner for that matter, it takes but a glance at that map to determine the field service representative nearest to the source of the emergency call A wire is immediately dispatched, if the man cannot be reached by phone, and in less than no time the call is being "serviced" Incidentally, the field service representatives make daily reports to the Glendale office, so that the latter will be constantly acquainted with the jobs on hand in the field, and what men are available for emergency work the following day.

The field service representatives like the service and parts depot managers, are experts on Kinner engines, and therefore well qualified to supply all information desired by a manufacturer, to superintend the installation of the engine in planes as well as any type of repair work necessary In short they are what the title implies . representatives of the Glendale office and an additional link between the plane manufacturer and the engine manufacturer.



The Kinner K-5 100 hp radial engine

For emergency calls that come into the service and parts depots, from either the local service stations or the plane owners, the depot maintains a plane ready for instant use. A licensed pilot is a part of each depot organization Therefore, if the report comes in that a plane is down some place and in need of engine repair, the replacement of parts for instance, the depot plane can take off immediately with a mechanic and parts and thus "save the day" for the plane owner The plane is also used by the service and parts depot manager or assistant manager to make trips about the territory and contact the various service stations.

As a further assurance that Kinner owners will receive the full benefit of Kinner service, stocks of parts are also sold to the plane manufacturers for redistribution to their various plane distributors and plane dealers A discount of sufficient size to enable the manufacturer to profit from the handling of the parts, is allowed. Thus it will be seen that every possible means of serving Kinner owners has been, or is being, arranged.

THE MAIN SELLING MARKET for the Kinner company consisting of airplane manufacturers, the factory itself does not attempt any retail, direct-to-customer selling Nor does it permit its service depots, which may have an engine on hand, to try retail selling Of course in isolated cases when a plane owner demands that the factory sell him direct, the request may be granted However the usual procedure is for the factory to refer the customer to the manufacturer of the plane he owns and purchase his new engine through him That in itself is a commendable policy for it is a goodwill building idea with regard to the airplane manufacturer

In fact, the officials of the Kinner company attribute their successful progress, apart from the quality of their product, to the fact that they are doing everything possible to render complete service to their customers, the airplane manufacturers, and their customers' customers, the airplane owners Complete co-operation between the Kinner company and the airplane manufacturers using Kinner products is striven for at all times When a plane is sold the engine manufacturer is notified, and then the Glendale factory writes direct to the owner and acquaints him with the location of the nearest Kinner service station where he may obtain expert Kinner service The parts depot in that territory is also notified, and in turn the local service station The latter contacts the plane owner and the result is a satisfied owner, and satisfied owners result in increased sales for both the airplane and the engine manufacturer.

Last but not least of the Kinner company's efforts to render complete and detailed service to owners of Kinner engines is the practice followed in the matter of labor charges for repair work at all Kinner service stations In the early days of the automobile, in fact not so very long ago at that, the car owner who entered an automotive service station, or repair garage, did so at the risk of losing the entire contents of his wallet In short, he was virtually at the mercy of the repair man as regards the cost of any repairs After years of "suffering" on the part of the car owners the automotive industry took steps to remedy the situation, with the result that today there are more or less standard rates for various repair jobs on an automobile However, it is still enough of a problem to be a thorn in the side of the automotive industry

Although aero engine repairing has not as yet reached a stage where standardized charges for various jobs can be determined on more than just a temporary basis, the Kinner company has taken advantage of the lesson learned in the automotive industry and has set a definite hourly labor charge for repair work Material costs naturally vary, but no matter what Kinner service station does the repair job, whether it be in New York, Wichita or Los Angeles, the customer is charged the same flat rate per hour for labor

When an organization stands ready at all times to render complete service to its product, and in addition takes steps to prevent the owner from being "gyped" when service is necessary, that organization is building up a clientele of satisfied customers And satisfied customers are stepping stones to bigger and better sales.

Gliding Activities

AT THE NATIONAL AIR RACES

W. R. Franklin coming in to land during the National Air Races at Cleveland after a tow from Ypsilanti, Mich.

AMONG the several new trends in American aeronautics displayed before the 400,000 or more persons attending the recent National Air Races in Cleveland, few were more thoroughly novel to a majority of the spectators than was the long-shelved sport of motorless flight

Because of the fact that the Cleveland meet introduced gliding on its regular program as the first time the sport and science had been featured on the regular bill of any aeronautic meet of nation-wide import in this country, it is safe to assume that most members of the audiences got their initial sight of a glider in flight during the 10 days of competitive activity

Despite being pushed about the program somewhat as mother might coerce "sonny" off the parlor floor when "papa" is about to perform a difficult gymnastic feat, glider devotees managed to come in for their share of publicity, and chalked up two major accomplishments—even though one of these was somewhat mis-carried by an unfortunate rush of other business

We speak of the second annual National Glider Conference, held by the National Glider Association at Hotel Winton on the morning of Tuesday, Aug. 27, and of the National Glider Contests, staged at the airport immediately following that conference and during the forenoon of the following day In the Conference followers of motorless flight succeeded in "pulling a fast one" on the power-driven boys by holding their meeting so early in the morning that most of the motored pilots were caught napping Otherwise, the National Glider Conference might not have enjoyed the success it attained As it was a good-sized crowd attended and learned the thoughts of many leaders, both in the power-driven and the motorless divisions of the craft It took real interest to turn out at eight in the morning, especially after late festivities the previous evening

THE CONFERENCE was called to order by Clifford W. Henderson, managing director of the Races He introduced Edward S Evans, president of the National Glider Association, who has done much toward popularizing the sport during the past year Following an address of welcome by Mayor John B Marshall, of Cleveland, Mr Evans, who presided, outlined both the accomplished and the intended program of the N G A Probably the most interesting portion of Mr Evans' address consisted of an appeal to the aircraft industry to give assistance to the association in accomplishing its avowed purpose of training one million third-class-license glider pilots.

"The National Glider Association," Mr Evans stated,

"has largely completed its experimental work, except in the advanced technical field, and the association now knows what to do, and how to do it. As rapidly as sufficient funds are available, we will carry on our program, which aims for the organization of a glider club in every city, town, and hamlet in the United States, and the training of at least one million glider pilots to their third-class license. In my judgment the Association should be provided with $100 000 annually by the aircraft industry to help defeay expenses of carrying on this work."

The Evans appeal directed attention to the potential airplane market that 1 000 000 glider pilots would comprise, as well as to the meteorological and aerodynamic skill contributed to the manufacturing and operating ends of the industry by such a number of youths versed in the handling of motorless aircraft.

After this followed an address of welcome by Floyd J. Logan, chairman of the race committee, and an introduction of L. F. Ross, director gliding activities at the Cleveland meet. Miss Amelia Earhart, noted woman flier and glider enthusiast then spoke briefly, stating that she found gliding an interesting and a fascinating sport, and she would be glad to do anything within her power to further motorless flight in this country.

Following short addresses of a similar trend by Charles L. Lawrence, of the Curtiss-Wright group, Capt. Frank M. Hawks, holder of the trans-continental speed record, Prof. Edward P. Warner, editor of Aviation and Dr. Wolfgang Klemperer, of the Goodyear-Zeppelin Corporation. Prof. R. E. Franklin, of the University of Michigan, was asked to give an account of his experiences during the past summer when he barnstormed through the East with a glider, and also to present his version of auto towing as a method of launching gliders.

The auto-towing method was pictured by Professor Franklin as being both highly interesting and safe for well-trained pilots and crews, but he said that he could not recommend it for the inexperienced, since auto towing presented elements of danger not found in properly conducted shock cord work. On the other hand, Professor Franklin stated, when practiced by experienced gliding enthusiasts, the auto-tow method really was safer than the use of shock cord. Auto towing, he said, is merely a means of putting a motor on the glider, hence the glider must be made structurally stronger. Once the glider is in the air, the speaker cautioned, the automobile should be kept to a speed not more than eight or ten miles in excess of the glider's take-off speed, since it is possible for a glider to take a considerable portion of the car's weight off the rear springs, an occurrence that may cause damaging consequences to the glider and its pilot. In his experiences, Professor Franklin said he began by using a tow-rope about 200 ft long, but had found that a rope 700 ft or even 800 ft in length would serve the purpose better.

Opportunity was given those present to ask technical questions of Dr. Klemperer, who is chairman of the N.G.A. technical committee, and many availed themselves of the privilege. One of the problems brought forth in the general discussion related to the possibilities of reducing the number of men necessary to carry on gliding work. It was complained that it is sometimes difficult to find enough men willing to "go gliding," since the work entailed is so considerable as compared with the actual piloting experience received by individual members of the party. A number of crew reducing schemes were advanced, one of the most interesting being an automatic electrical launching device.

In addition to those already mentioned the Conference was attended by a distinguished group of Air Race pilots and many well-known figures in the industry, including Mrs. Blanche Noyes, Prof. F. W. Pavlowski of the University of Michigan, Prof. Peter Altman of the University of Detroit, Luther K. Bell, of the Aeronautical Chamber of Commerce, Lieut. R. S. Barnaby, U.S.N., the first person to qualify for a first-class glider license in America, Ray Cooper, of the Detroit Board of Commerce, and Franz Gross, designer of the Darmstadt soarer.

As has been mentioned, the contestants in the glider contests at the airport found themselves so pressed for time and space, that no fair idea of the respective abilities of all of the participants could be gained. Therefore, the N.G.A. contest committee, after reviewing the events, decided that, due to the conditions under which the contests were held some of the prizes would be distributed by the judges on a basis of achievement. Entrants in two events which had to be cancelled for lack of time were thus given an opportunity to share in the awards. On that basis trophies were awarded in the following manner:

First first prize: To the Jackson (Mich.) Glider Club, for distance, shock cord launching method, 592 ft. Elmer Westerland, pilot.

First second prize: To the Pioneer Gliding and Soaring Society, of Orion, Mich., for distance, shock cord launching, 479 ft. Oscar Kuhn, pilot.

Second first price: To the Cleveland Glider Club, for best time, shock cord method 16.45 sec. William Strauss, pilot.

Second second prize: To the University of Detroit Gliding Club, for time, shock cord method, 15 sec. Kenneth H. Carr, pilot.

Third first prize: To the Jackson Glider Club, for the best time, auto-towing with return to starting point, one minute, 14 sec. and landed 5 ft. from the line.

Fourth first prize: To the Cincinnati Glider Club, for having emerged second best in both distance, shock cord method, and time, auto-towing method, under adverse circumstances, and for sportsmanship during entire meet. William Fowler, pilot.

Fifth first prize: To the Pioneer Gliding and Soaring Society for their commendable contribution to gliding activities throughout the meet, for good performance, and for splendid sportsmanship.

Sixth first prize: (For motored pilots only) To Capt. Frank M. Hawks, for remaining one minute, 45.5 sec. in the air and landing 14.25 yd. from the line.

Sixth second prize: To Maj. Reed G. Landis, for remaining 37 sec. in the air and landing 66.5 yd. from the line. (It should be mentioned that Captain Hawks flew the secondary, high performance glider, which had been towed to Cleveland behind an airplane and landed on the airport by its pilot, Wallace Franklin, brother of the University of Michigan professor who spoke at the glider breakfast, while Major Landis flew a primary training glider borrowed from the Jackson Glider Club. Between Hawks' trial and Landis' trial the secondary glider had been wrecked in a faulty landing by another motored pilot.)

Seventh first prize: To the University of Detroit Glider Club, for good performance in both methods of launching, and for sportsmanship and for having finished a close second in elapsed time on auto-towing without previous experience.

Seventh second prize: To a group of high school boys of Des Moines, Ia., who brought a home-built glider to the Races, and flew it gamely throughout the shock cord launching contests. (In addition to the trophy, the Iowa youths were presented with a new PT training glider by W. J. Scripps, president of Gliders, Inc., of Orion, Mich., manufacturer.)

Eighth first prize: To Wallace Franklin, of Ann Arbor, Mich. for the most impressive performance during the meet. (Franklin, towed to Cleveland from Ypsilanti, Mich., behind a Waco biplane, cut loose 2 500 ft. over the airport, and glided to a beautiful landing before the stands.)

Ninth first prize: To Dr. Wolfgang Klemperer, of the Akron Glider Club, for attempting to bring a Condor soarer, towed by a Goodyear blimp to Cleveland from Akron. (Dr. Klemperer, flying at about 700 ft., had covered nearly half the distance when the tow rope parted. He continued to soar, in the direction of the Cleveland airport, however, and landed 5 miles closer to his goal, near Wallings Corner, Ohio. In his report to the association, Dr. Klemperer stated he found a field sufficiently large but that he had difficulty in bringing his ship to earth, heat currents, rising from the ground, causing it to float nearly the entire length of the field at an altitude of only a few feet. Upon nearing the end of the field, the pilot said, he was compelled to nose the soarer into the ground, slightly cracking the shell.)

Eighth second prize: To Capt. Feank Hawks for the longest time in the air in a glider. (Captain Hawks was towed to Cleveland by an airplane from Pontiac, Mich., and cut loose from the plane so high over the airport it required more than 20 min. for him to glide to a landing.)

W. H. Franklin "sets her on the ground" at the end of a 200 mile tow

Capt. Frank Hawks in the air at the 1929 National Air Races at Cleveland, Ohio

Thus the first national glider contests were held and the various trophies duly awarded. The ability displayed by most of the youths participating in those events held reflected how American youth is taking to the idea of flight.

The Cleveland airport or any other airport is of course very unsatisfactory as a ground for glider demonstrations. Soaring flight depends upon rising currents, which are only to be counted on in the neighborhood of hills, and even straight gliding with shock-cord launching must start from an elevated point to secure any satisfactory duration. The crowds at Cleveland were interested and impressed by a demonstration that had to be given under very poor conditions for any kind of gliding except the auto-towed. Donald Walker, manager of the National Glider Association, has recommended to the organization that hereafter no more glider contests should be held on airports during any motored-plane meet.

THE OPERATION OF *Thompson Aeronautical Corp. Lines*

By JOHN T. NEVILL

SINCE ORGANIZATION of the company in 1927 Thompson Aeronautical Corporation has become the fourth largest air mail operator in the United States in point of miles flown daily Although the company probably has more small town stops than any other operator in the nation, it also serves the second, fourth and fifth largest cities in the country, i.e., Chicago, Detroit and Cleveland. The company's lines, known officially as C. A. M. 27, contacts with 16 cities in the four states, 12 of them being in Michigan This gives Michigan the worth-while distinction of having more cities receiving air mail service than any other state in the Union Another distinctive feature of C A M 27 is its geographic complexity Unlike practically all other contract air mail routes, No. 27 stretches from one large city in one state to another large city in a second state, via a third large city and 12 smaller cities in a third and a fourth state A glimpse of the accompanying map showing the Thompson airlines spreading out, finger-like, over the lower peninsula of Michigan, with two fingers extending from Michigan to Cleveland and two from Michigan to Chicago, will give the reader some idea as to this complexity

Still another distinguishing factor in the operation of C A M 27 is the amphibion passenger, mail and express service operated six days a week between Detroit and Cleveland This division known as the marine division of the company's lines was inaugurated on May 14 of this year and is the only amphibion passenger, mail and express service between two inland cities within the United States.

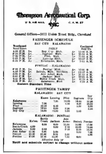
C. A. M. 27 can be said to be an outgrowth of C A M. 6 and C. A. M 7, formerly operated between Detroit and Cleveland and Detroit and Chicago respectively, by the Ford Motor Company beginning Feb 15, 1926, and also of the night spur line operated by National Air Transport between Detroit and the Transcontinental trunk line at Toledo The present operating company was organized in the summer of 1927 in Cleveland by Edwin G Thompson, vice-president of the $6,000,000 Thompson Products Corporation, and son of C E Thompson, first president of the Glenn L Martin Company, with R C (Tex.) Marshall, veteran government mail pilot, as vice-president and general manager Early in 1928 Thompson Aeronautical Corporation was awarded a contract to carry the mails between Chicago and certain Michigan cities, including Kalamazoo, Muskegon, Grand Rapids, Bay City and Detroit, the routes to these cities having been sought after Mr. Marshall had made a careful survey of the lower peninsula of Michigan, with particular reference to the various industrial centers likely to furnish considerable mail poundage to the projected lines.

The lines were mapped in three separate divisions, all of them converging at Kalamazoo One of these divisions began at Chicago and extended to Muskegon, Mich, by way of La Porte and South Bend, Ind, Kalamazoo and Grand Rapids, Mich Later, La Porte was eliminated from the route A second division began at Kalamazoo and extended to Bay City, with stops at Lansing and Saginaw. The third division also began at Kalamazoo, projecting to Detroit, via Battle Creek, Jackson and Ann Arbor

Above. E. G. Thompson, president Thompson Aeronautical Corp Left: John L. Rudes, operations manager

Operation of these three lines was begun on July 17, 1928, with only five planes comprising the flying equipment From that nucleus the Thompson mail lines have grown into what can be called six divisions operating today. Chronologically, the extensions were as follows: On Nov. 27, 1928, Flint was made a stop on the Kalamazoo-Bay City division, and the Kalamazoo-Detroit division was extended to include Pontiac The following April 1—April this year—the company flew its first mail over a new division Bay City—Cleveland This division, an overnight, both-way, service between Bay City and the transcontinental air mail line at Cleveland, is the longest of the Thompson lines, being 238 miles in length, and having stops at Saginaw, Flint, Pontiac, Detroit and Toledo It replaced the spur line operated by National Air Transport between Ford Airport, Detroit, and the N A T trunk-line at Toledo, which ceased operation on the day the elongated Thompson line began This marked the first time the Thompson mail lines touched Cleveland, in which city was, and still is, their home office In addition to the mail over the 238 miles of its length, this division also carries express between Detroit and Cleveland

The next extension of service came last May 14, on which date the company inaugurated the aerial passenger, mail and express line between Detroit and Cleveland, using three Loening-Amphibians, and maintaining a schedule of four trips daily, each way, except Sunday Originally, the mail carrying over this division was confined to the noon flights between Detroit and Cleveland and between Cleveland and Detroit, but on July 8 the 10 a m Cleveland bound plane was placed into mail service. Addition of the 10 a m Detroit to Cleveland plane was an inexpensive stroke resulting in greatly increased service since it made direct connections with the eastbound N A T with Colonial to Buffalo, with Clifford Ball's route to Pittsburgh, and with other contractors departing from Cleveland around noontime



Thompson Aeronautical Corp.

U. S. AIR MAIL C. A. M. 27

General Offices—2011 Union Trust Bldg., Cleveland

PASSENGER SCHEDULE

BAY CITY KALAMAZOO

Westbound Read Down		DAILY		Eastbound Read Up
[illegible] P. M.	Lv	Bay City, Mich.	Ar	[illegible] A. M.
[illegible] P. M.	Lv	Saginaw, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Lv	Flint, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Lv	Lansing, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Ar	Kalamazoo, Mich.	Lv	[illegible] A. M.

PONTIAC KALAMAZOO

[illegible] P. M.	Lv	Pontiac, Mich.	Ar	[illegible]
[illegible] P. M.	Lv	Detroit, Mich. [illegible]	Lv	[illegible] A. M.
[illegible] P. M.	Lv	Ann Arbor, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Lv	Jackson, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Lv	Battle Creek, Mich.	Lv	[illegible] A. M.
[illegible] P. M.	Ar	Kalamazoo, Mich.	Lv	[illegible] A. M.

Eastern Standard Time

PASSENGER TARIFF

KALAMAZOO BAY CITY

	Kazoo	Lansing	Flint	Saginaw	Bay City
Kalamazoo		7.00	10.00	18.00	17.00
Lansing	7.00		6.00	8.00	10.00
Flint	12.00	6.00		3.00	6.00
Saginaw	17.00	8.00	3.00		2.00
Bay City	18.00	10.00	6.00	2.50	

KALAMAZOO PONTIAC

	Ka'zoo	Battle Creek	Jackson	Ann Arbor	Detroit	Pontiac
Kalamazoo		6.00	8.00	11.00	14.00	17.00
Battle Creek	4.00		6.00	7.00	12.00	15.00
Jackson	8.00	6.00		5.00	8.00	10.00
Ann Arbor	11.00	8.00	5.00		5.00	7.00
Detroit	13.00	12.00	8.00	5.00		4.00
Pontiac	17.00	15.00	15.00	7.00	4.00	

Effective July 15

Tariff and schedule subject to change without notice

A reproduction of the time table of Thompson Aeronautical Corporation

Early last Spring it became apparent to Thompson officials that they were overlooking an opportunity for still further service to air mail users because of an unfortunate lack of connection between mail planes arriving in Chicago from points west and south and crack overnight trains between Chicago and Detroit It seemed that a majority of the seven air mail lines "feeding" the two overnight trains, particularly the Boeing line from the west coast, did not arrive in Chicago in time for their respective cargoes to be "worked" and placed aboard the first of these trains, which pulls out about 9 p m. By placing this mail aboard the second train, leaving Chicago at 12 midnight, a forenoon delivery was missed in Detroit, with a delay of from 6 to 24 hours effected in delivery in other cities of Michigan

The Thompson company eliminated This delay with one comparatively inexpensive addition to its service. They reasoned that the fast 9 o'clock train would require 2 hours 30 min. to reach Kalamazoo, arriving there at 11 30 p.m. One of their planes could fly it easily in 1 hour 15 min, with elimination of the stop in South Bend The plane, therefore, could remain at the Chicago Airport long after the early train had departed from the city, pick up the incoming mail from the west, south and northwest, and overtake the fast train in time to place the mail aboard it in Kalamazoo

With lighting facilities and an emergency field system between Chicago and Detroit completed as far as Kalamazoo this plan was made easier, so, on May 27, this year, the newest of the Thomp-

A map drawing of the various day and night lines operated by Thompson Aeronautical Corporation. Note the finger-like "coverage" of the territory

son divisions was placed in operation. The Chicago-Kalamazoo overnight line, Thompson officials say, will be extended to Detroit as soon as the Department of Commerce has completed installation of beacons along that route.

Thus, today, we have the company operating C.A.M. 27 in six divisions, each division ranging from 100 to 238 miles in length. For convenience sake we will call the Chicago-Muskegon run No. 1, the Kalamazoo-Bay City run No. 2, the Kalamazoo-Pontiac run No. 3, the Bay City-Cleveland night run No. 4, the Chicago-Kalamazoo night run No. 5, and the Detroit-Cleveland amphibion run No. 6. These six divisions are operated with 21 planes manned by 15 pilots. Two of the pilots, George W. Hill and Frank Merrill, are assigned to Run No. 1, being domiciled in Chicago. C. P. Oleson is assigned to Run No. 2. He flies the route for two days and is relieved the third by Fred A. Jones. Run No. 3 is flown for two days by F. E. Kelch, then Kelch is relieved for one day by Jones. Oleson, Kelch and Jones live in Kalamazoo.

Eddie Preston and C. W. March alternate on Run No. 4, the Bay City-Cleveland night run, both living in Bay City. The regular pilot on the Chicago-Kalamazoo night run is Johnny Huber, who lives in Kalamazoo. Huber is relieved every fourth night by Hill, Hill on such nights flying the night mail after having completed the Chicago-Muskegon round trip. After his arrival with the night mail from Chicago, Huber, ordinarily, remains in Kalamazoo as a reserve pilot until the following evening at 5:35 central time when he ferries his Pitcairn back to Chicago. By holding Huber in Kalamazoo until after the arrival of the company's planes from Muskegon, Bay City, and Pontiac, the company is assured that the mail collected by the Muskegon Chicago-bound plane from the Bay City and Pontiac planes will go through to Chicago on schedule, even though the total collection should prove too heavy for one plane to carry. Should this happen, of course, it would be a rarity in the present light of things, the principal reason for holding Huber being to utilize his service as a reserve pilot until the incoming pilots land at the Kalamazoo Airport.

Run No. 6, the amphibion line to Cleveland, is flown by three pilots, L. F. Bishop, "Cy" Caldwell, and A. H. Dewitt, all of them residing in Cleveland and being off every third day. Eddie Merritt, in charge of the company's flying operations at the Cleveland Airport, is used as a reserve pilot on this run. Each of the three amphibions, incidently, are taken off the run every third day, and kept at the Cleveland Airport for a thorough inspection.

ALTHOUGH, theoretically, the entire Thompson mail system operates on a definite schedule, happily the schedule can be made flexible enough to make practically all connections with other mail lines, yet serve their purpose within their own territory. The one exception to this is the marine division in which Loening Amphibians take off from Detroit and Cleveland for the other city at 10 a.m., 12:30 noon, 3 and 5 p.m., daily, except Sunday. The daily service can be said to begin at 7:15 a.m. Central time, when the Chicago-Muskegon plane takes off from the Municipal Airport at Chicago after having collected mail from the night operators flying into that point. This plane arrives in Kalamazoo at 8:50 a.m., Central time, finding the Kalamazoo-Bay City and Kalamazoo-Pontiac planes warmed up and ready to take off. At 8:55 a.m. all three planes leave Kalamazoo, Run No. 1,

Exterior view of the Thompson hangar at the Cleveland (Ohio) Municipal Airport

being due in Muskegon at 9:55 a.m. Central time, Run No. 2 being due in Bay City at 12:05 p.m. Eastern time, and Run No. 3 due to arrive in Pontiac at 12 noon, Eastern time.

In the afternoon these three planes start from Muskegon, Bay City and Kalamazoo, respectively, all being timed to arrive in Kalamazoo at 5:35 p.m. Central time. In Kalamazoo all of Michigan's air mail is loaded aboard the Muskegon-Chicago plane, which, according to schedule, takes off at 5:40 p.m., arriving in Chicago at 7:20 p.m. So, generally speaking, operation of the company's daytime overland routes can be likened to a motion picture of a sky-rocket in action, which, after having completed its bursting and scattering effect, is reversed, depicting the rocket's movement in reverse order.

While this route is being flown, the company's amphibions are flying between Detroit and Cleveland, taking off four times daily from each city and consuming but 55 min. between the terminals.

The night runs begin in Bay City at 7:55 Eastern time, when the Pitcairn Mailwing, used on this division, takes off for Cleveland, at which point it arrives at 11:30 p.m. Eastern time, in time to connect with both the east and west bound N.A.T. night planes. After picking up the Michigan mail from the east and west bound N.A.T. planes, the Pitcairn, flown by the same pilot, departs at 3 a.m., arriving back in Bay City at 6:35 a.m.

Theoretically, though, the nocturnal runs really start with the run between Chicago and Kalamazoo. According to the schedule, Huber, loaded with mail collected from the Boeing-San Francisco route (due in Chicago at 6:40 p.m., Central time), is supposed to take to the air at 7:15 p.m., in order to beat the Detroit-bound train into Kalamazoo. It has been found practical, however, to hold this plane at the Chicago Airport until other mail planes are in, these latter including Embry-Riddle and Interstate (due from Cincinnati and Atlanta, respectively, at 7:10 p.m.), N.A.T. and Robertson (due from Dallas and St. Louis, respectively, at 7:20 p.m.) and Northwest Airways (due from Minneapolis at 7:30 p.m.). After taking aboard whatever Michigan and Canadian mail might be brought in on those planes, the Thompson plane can leave Chicago any time up to 10 o'clock and still beat the 9 o'clock train into Kalamazoo.

The entire Thompson mail schedule, in fact, is similarly flexible, either the day or night Michigan bound plane being able to wait in Chicago until a maximum of poundage has been taken aboard—this delay being prolonged until danger of missing connections on the opposite end appears in the offing. One of the most important of

these connections was placed in effect on the day the writer began his flight over the company's mail lines. We speak of the Montreal-Detroit mail line, operated by Canadian Airways, Ltd. This service, daily except Sunday, begins in Montreal at 9:15 a.m., Eastern time, arriving at Ford Airport at 4 p.m., Eastern time, after stops at Toronto, Hamilton, London and Windsor. The Canadian plane remains in Detroit and starts back to Montreal at 5:15 a.m., landing there at 11:30 a.m.

Poundage figures furnished by Charles A. Rheinstrom, general traffic manager of the Thompson company, show that the Thompson lines carried 5,572 lb. of mail in July, 1928, 26,588 lb. in August, 10,871 lb. in September, 9,585 lb. in October, 9,230 in November, 8,706 in December, 8,402 in January, 1929, 8,489 in February, 9,309 in March, 14,783 in April, 15,565 in May, 17,341 in June, and 19,876 in July. The writer is cognizant of the fact that the August, 1928, jump was due to the Reo Motor Car Company, of Lansing, which organization staged a publicity stunt by sending 10 tons of air mail letters over to Thompson line to Chicago. An especially mustered armada of 17 Stinson-Detroiters was required to handle this shipment, which took place on Aug. 21, 1928. Incidentally, that feat is said to represent the largest poundage ever dispatched over any one company's lines on any one day in the history of American air mail.

The sudden increase in April, this year, no doubt was due to inauguration of the Bay City-Cleveland division. That being as it may, the increase in poundage from January, 1929, to the end of July, seems to indicate that the territory served by the company is taking to the idea of mailing matter by air, and augurs well for the contractor's future revenue.

IN ADDITION to being contractors to carry the mail, the Thompson corporation is distributor in Michigan and Ohio for Stinson, Keystone-Loening, Pitcairn and Gypsy Moth planes. It is natural that their operating equipment should consist of such craft. Stinson cabin planes are employed on Runs No. 2 and 3, over which just recently the company began to carry passengers. Runs Nos. 1, 4 and 5, however, are flown with open cockpit biplanes, all Pitcairns, except one Stearman owned by Pilot Hill and chartered to the company under a special arrangement. The Detroit Cleveland overlake service, Run No. 6, was primarily designed as a passenger line, and, of course, employs Loening Amphibians. The mail carried over the marine division provides an incidental revenue, as do the passengers carried over the Kalamazoo-Bay City and Kalamazoo-Pontiac runs.

The Thompson maintenance staff is composed of 22 mechanics, 8 of them being in Kalamazoo, 4 in Chicago, 4 in Bay City, 2 in Pontiac and four others distributed between Saginaw, Flint, Detroit and Muskegon. Added to the ground personnel, of course, are the various terminal managers and their clerical help, G. H. Brieschke being located in Chicago, W. A. Goodyear in Kalamazoo, C. T. Talpo in Bay City and K. Matucha in Pontiac. John L. Ruden, operations manager, maintains headquarters in Kalamazoo, and Charles R. Speers, Bay City-Cleveland divisional traffic manager, in Detroit.

In flying C.A.M. 27 Thompson pilots have a number of problems to contend with that practically no other mail operator has to face. Probably the major of these is a lack of adequate airports. The major portion of its stops being small cities like those of Michigan outside of Detroit, this is a condition to be expected. However, of these smaller cities there are several notable exceptions, Kalamazoo, Pontiac, Battle Creek and Bay City having ports of sufficient area, excellently equipped. Pontiac probably has one of the finest airports in its section. Bay City, just below the edge of that sparsely populated upper section of Michigan's lower peninsula, is building the James Clements Memorial Airport into something of which it can be proud. This port lies along the Saginaw River and can easily be made to include a base for seaplanes, flying boats and amphibions, converting Bay City into a departure point for air tourists bound for the vacationing spots of upper Michigan.

Others of Michigan's airports, those at Lansing, Flint and Ann Arbor, for instance, are so poor Thompson pilots dare not land on them during bad weather. It is expected that, under the new State Board of Aeronautics, appointed recently by Governor Fred W. Green, under the chairmanship of William B. Mayo and the directorship of Capt. Ray Collins, both of Detroit, this condition will be remedied. The State proposes to construct and operate a string of state-owned airports.

ANOTHER PROBLEM peculiar to operation of the Thompson system is the nearness of one stopping point to another. On the Bay City-Cleveland division, for instance, the pilot takes off at Bay City and flies but 12 miles to reach Saginaw. Flint is but 31 miles from Saginaw, and Pontiac is only 33 miles from Flint, Detroit 23 miles from Pontiac, Toledo 54 miles from Detroit, and Cleveland 85 miles from Toledo. Other divisions are similarly spaced, way points ranging from 12 to 100 miles apart. This, of course, has its advantages in the event of engine trouble, but in stormy weather (and Michigan has its share of it) it means that the pilot must fly through it if the mail is to get through. On jumps of several hundred miles, or more, of length, such as some of those on other mail routes, the pilot may, and often does, find it to his advantage to climb over, or go around a particularly mean area lying directly across his usual path.

With one of its divisions extending over, and two others extending around large bodies of water, fog becomes another trouble-making factor. Added to this is the ever-present pall of smoke through most of which the Thompson pilot must pass in getting into the Chicago Airport. Still another factor, although less troublesome, is the wind variations around lower Lake Michigan, due, it is said, to the temperature of the lake.

Despite this, C.A.M. 27 recently closed its initial year of operation—a year during which the operator's planes flew 396,536 miles—with only two minor accidents. Total cost of repairs for the year were given as approximately $5,000. During this year, also, T.A.C. planes carried approximately 160,000 lb. of mail, with none being defaulted. Since completion of the first year the company's amphibion run, unfortunately, has met with one serious accident.

According to Mr. Ruden, the Thompson policy is to subject every new engine to a major overhaul after using it between 250 and 300 air-hours. Overhauled engines are grounded for overhaul after not more than 200 air-hours. All of the company's major overhaul work is done at the Cleveland Airport, where the corporation maintains its principal shop, and is distributor for Wright engines and engine parts.

T.A.C. is insured for potential liability, covering both passengers and planes, and embracing fire, tornado, theft, passenger liability and property damage, to the extent of $4,000,000.

THE 1929 *Schneider Trophy Contest*

By *Aviation's*
British Correspondent

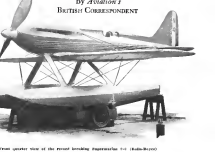
THE GREAT QUESTION here at Calshot, before the race is the maximum speed of the two new British defenders of the Schneider Trophy. While the secret is being carefully guarded, I can hazard a guess that if every anticipation is realized aircraft speeds may be raised to 360 m.p.h. over the standard three-kilometer course. [Our correspondent's estimate on this point, written and mailed more than a week before the race, proved remarkably accurate, as the first trials of the Supermarine machine over the straightaway speed course on Sept. 10 showed 355.8 m.p.h.—Ed.]

The new Rolls-Royce engine in the Supermarine S-6 is, as one of the pilots expressed it, "a wizard of an engine." At one moment it will tick over at 450 r.p.m. as gently as a car engine and the next be giving its full horsepower in a deep throated roar. Yet throughout the throttle range it will maintain an astonishing evenness of carburation. On Aug. 30, the first Supermarine seaplane of the two finished, with a new engine and increased cooling area for the water radiators, was given its final test, and this may now be regarded as mechanically ready for the race day.

The second British defender, the Gloster-Napier, has been dogged by misfortune almost from the day it arrived, a week late, to miss four days of perfect flying weather. It is true that rough seas prevented any high speed machine leaving the slipway from the day of its arrival until Aug. 30, but on that morning the Gloster-Napier did miss its first real chance to get into the air on an extended flight simply because of a number of small but irritating problems connected, first, with getting a steady flow of fuel to the engine, and then of overcoming a fluctuating oil pressure. Later in the day the engineers ran the engine up on the beach. The Napier engine for the first time seemed completely happy, and all was ready for flight—but just half an hour too late to get smooth water before a rising wind.


Flying Officer Waghorn crossing the starting line in the 1929 Schneider Contes

SO WITHIN EIGHT DAYS of the race, and within seven of the navigability trials, only one British type is really ready. The Italians at last are here, but do not expect their racing machines to arrive for another day or so. The Italian team itself obviously had no part in the suggestions of withdrawal from the race and are genuinely glad to be here. The members tell me that their real reliance is placed in the two Macchi 67s, the type on which Captain Motta was killed; that the third and remaining Fiat is coming, a Macchi of 1927, and possibly two entirely untried machines. One is a Savoia Marchetti, which is a central nacelle type with outriggers to the tail unit to provide for a propeller driven by a rear engine. There is another engine in tandem driving a tractor propeller, and the pilot sits between the two engines. Then there is the Piaggio, a revolutionary conception described as a flying wing with, one presumes, some sort of rudimentary float with the pilot sitting in the wing and with one engine. How it can survive a choppy sea, use its airscrew without picking up green water and obtain control remains a mystery. [The Italian dependence in the race was finally placed upon the Macchi 66 and upon the old Macchi of two years ago.—Ed.]


Front quarter view of the record breaking Supermarine S-6 (Rolls-Royce)

The new Macchi seaplanes and the Fiat appear the most formidable Italian competitors, though the latter seems to be a delicate craft to handle from the control point of view. Considerable reduction again has been secured in parasitic drag in all the racing designs, and it is more than ever regretted that the United States, which undoubtedly showed the world in 1923 the importance of clean streamline shapes, should now have dropped out of racing competition.

Both the Supermarine-Rolls Royce S-6 and the Gloster-Napier 6, in different directions, represent a departure from the policy of 1927. Then minimum frontal area was the outstanding feature, but this year the Supermarine designers have based their hopes upon a larger and more powerful engine, which in its standard Service form gives 830 hp., while the Gloster company has forsaken its biplane form for a monoplane, again at the dictates of higher power though in this case the frontal area of the power unit remains the same or is even a trifle smaller. Both engines are supercharged, and this, of course, has meant extra weight, greater length, and also more weight in the provision of increased fuel.

The Supermarine seaplane with its very much more powerful engine, which burns something like 2 gal. per min. at full throttle, has definitely become a bigger machine all round, and frankly lacks the slender grace of the 1927 racer with the Napier Lion. On the other hand the Gloster machine has unquestionably gained in artistry of line by the adoption of the monoplane form, seems no whit larger to the eye than the S-5 of 1927, and of the two, gives the impression of containing much more original design work in the direction of reducing not only head resistance but mutual interference between the components of the aircraft.

BROADLY SPEAKING, the position as estimated here at Calshot before the race is this: Both machines have been designed to meet the same specification, and with the specified minimum horsepowers, theoretically there should not be more than 1 or 2 m.p.h. between them. Actually, assuming for the moment equal aerodynamic efficiency, the advantage must be with the seaplane which has the better power-weight ratio, and in this respect the Supermarine seaplane should have the best chance. Its Rolls Royce engine is only at the beginning of its development, whereas the Napier Lion must be reaching the limit from a power point of view. The problem which is intriguing us all here is how much extra horsepower above that guaranteed under the original specification can the Rolls Royce racing engine safely be called upon to deliver for one hour at full throttle, and upon the answer may be said to depend the fight between the two machines for extreme speed. The Napier people with all their long experience of the Lion engine believe that whatever power they give above the minimum can be held without breakdown, whereas the Rolls Royce staff, we think, realize that they must exceed their contract to counterbalance the extra size and weight of the seaplane which carries the engine.

IT IS AN OPEN SECRET that this new engine has not only performed extremely well, but has given a very much increased horsepower over that called for; but, and it is a big but, too, no one knows yet how long the engine can be relied upon to run at that vastly increased horsepower before some trifling failure may put it out of commission. [Although no official figures have yet been given out, rumors of 1,400 or 1,500 hp. from the Rolls Royce were rife before the race.—Ed.] Undoubtedly the Rolls-Royce firm is in a better position in regard to supercharging, for it has a specialized knowledge of this method of increasing power and its supercharger is entirely the product of its own designing staff; whereas the Napier firm has taken the supercharger developed by the Bristol Aeroplane and Engine Company and with further co-operation from the British-Thomson-Houston Company, British allies of the General Electric, has adapted it to the Lion type. Both superchargers, of course, are of the centrifugal fan type, and are placed

between the carburetors and the intake manifolds, and appear to have been brought to a high pitch of efficiency mechanically while the running of the engines suggests that all carburation difficulties have been overcome, especially in the Rolls-Royce unit

Once more assuming equal power-weight ratios, visual comparison of the two seaplanes suggested that the Gloster-Napier might be the faster because of a greater refinement in detail, but here again I am quite prepared to find first impressions falsified by actual results Unquestionably, however, the Gloster seaplane pleases the eye most Both fuselages are made of duralumin upon the monocoque principle; but whereas the Supermarine is plated in parts very much on the lines of a ship's hull the Gloster fuselage has the absolutely smooth contour of a yacht, and even on the floats there is not a projecting rivet to be found anywhere. Some figures given me as to the resistance of a seaplane float with flush riveting, as compared with another in which ordinary rivets were used, show a surprising reduction in total drag

In both British machines ordinary "stream-line," or lenticular, bracing wires have been abandoned for wires of theoretically correct and unsymmetrical, section These have been milled to proper shape instead of being rolled, and I understand the difference between the two shapes is equivalent in the case of one of the seaplanes to as much as 4 m.p.h This illustrates the importance of reducing all external forms of bracing to a minimum, and allied with that is the necessity of carefully arranging for all the wires to enter the wings or body at angles as nearly a right angle as possible If the front view of the Gloster machine is examined from that standpoint, the reason for certain features will become more plain The slight downward curvature at the wing roots is intended to provide better angles for the wires, and the position of the float struts, which do not approach a common point, is again dictated by the need of avoiding all possible interference

The wing shape also has distinct originality, for it is an effort to combine the lower drag of a thin wing with the higher lift characteristic of a thick section As the photograph shows, the wing thickens toward the outer portion, with maximum thickness where the bracing wires are attached It would appear that, apart from other advantages, such a wing should have the effect of increasing lateral control at low speeds, as the inner section will begin to lose its lift before the outer part In plan form, also, the maximum chord occurs at the point of maximum thickness

Both designers, too, have had it in mind to enclose the pilot entirely by continuing unbroken, the top line of the fuselage, leaving openings at the side only, with of course the usual tunnel type racing windshield The adoption of this modification will rest with the pilots, and so far no decision has been made, though it would seem that another slight gain in speed should result Another change which is certainly to be made is the fitting of different floats for the actual race, and this after all is merely an effort to play for safety in the preliminary practice Again the effect upon the extreme speed can only be assumed, but a few more miles per hour are expected A number of the bracing wires being used on the Supermarine during the practice period are redundant, and they too will be removed for the race

It is not necessary to describe the machines in detail, for the photographs are sufficient, but a few details of the alterations in the water and oil cooling systems will have a technical interest

The Supermarine machine this year has adopted a new form of wing radiator, as the actual skin of the wing is a stressed member It consists of two sheets of thin duralumin held apart by distance pieces and rivets to form a continuous waterway, and when the radiator was tried in the air it was quickly found that the cooling was not sufficient for the very much increased power being given by the engine. It was realized that the cooling area could be very much increased if the inner side of this radiator on the top and bottom of the wing could be used, and so three small louvres were fixed to the underside of the wing tips and at least double the number of similar louvres fixed to the top surface of the wing by the root to permit of a flow through the wing

The nose of the Supermarine Rolls-Royce S-6

The result of the tests was not disclosed officially, but it appeared that a marked improvement was effected, and I believe that it is correct, broadly speaking, to say that the power which the new Rolls-Royce engine can deliver is governed now almost entirely by the efficiency of the radiator system There have been suggestions that ethylene glycol should be tried for cooling, but the experiment has not yet been made. The problem of keeping the oil within reasonable working temperatures has this year been much easier than in 1927, and no difficulty is being experienced as a result of the installation of a very elaborate system The oil tank of the Rolls-Royce engine is now the hollow fin of the tail, and from here it is pumped to the engine along a thin keel which can be seen underneath the fuselage; on the return it passes along triple duct oil coolers running the

length of the fuselage When it finally returns to the tank in the fin it is first sprayed against the walls of the upper part of the fin further to extract heat. Actually, it is calculated that the number of heat units absorbed by the oil, if it could be translated into useful energy, would be equal to over 60 hp The fuel, it will be remembered, was stored in one float in the 1927 machine, but with the supercharged engine fuel tanks of steel form the central portion of both the duralumin floats.

The engine of the S-5 had an unpleasant habit of cutting out on a severe turn owing to the acceleration forces temporarily starving the carburetor of fuel, overcoming the action of the pump drawing fuel from the floats, and as these acceleration forces are even more intense on the new machines elaborate piping and reserve tank arrangements have had to be devised to insure a steady flow of gasoline under all conditions of manoeuver likely to be required for the race

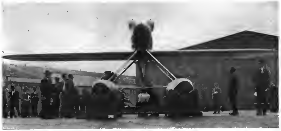
Flying Officer Waghorn, winner of the 1929 Schneider Trophy Contest

Much to everyone's satisfaction the Supermarine-Rolls-Royce flew perfectly the first time, and nothing was needed beyond a slight alteration in the incidence of the wings to get perfect trim Control surfaces needed no modification whatever, and from that moment the sole concern of the designer and the pilots has been to control engine temperatures and adjust throttle controls to give the most suitable mixture Everyone is impressed by the ease with which the Rolls engine starts and the gentle way in which it will tick over. This is in marked contradiction to the Napier Lion, which has always been uneven when it is idling, and only begins to sing a sweet and even note when the engine is turning over quite fast

So much practice was carried out on the first Supermarine seaplane that inside a week it had been returned to the works for a new engine to be fitted, and incidentally to incorporate a few small modifications which the 2½ hours' running had suggested. Previously, it had to go back owing to a dent in one of the floats, caused either by hitting solid water in the wash of a steamer or some obstruction R J Mitchell, the designer, decided however to take no chances and while the machine was at the works he not only put extra stiffeners under the bow plates of the one float but also strengthened the other.

Then in the second week of the practice the next Supermarine came to the station at Calshot, and this has also been flown for nearly an hour Then poor visibility in the early morning and a rough sea and high winds for the rest of the day stopped further flying

Owing to difficulties already mentioned, the Gloster-Napier until nine days before the race had only been in the air for a minute The taxiing trials were completely successful, but when the pilot, Squadron Leader Orlebar, essayed to take the machine off, just as it got into the air the engine showed momentary signs of starvation [It is interesting to note that these seaplanes were given their first tests by the captain of the British team, whose rank is equivalent to that of major in the U S Army, although he did not fly in the race itself Squadron Leader Orlebar attained his rank at an age less than that of many first lieutenants in our Air Corps, the British promotion system being much more elastic



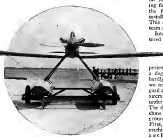
Front view of the Supermarine S-6. The keel of the fuselage is the return oil duct from the fin to the engine

than our own —Ed] It picked up again, but the pilot wisely decided to alight while he had good conditions He flew probably two miles, and on his return reported that from a control point of view the Gloster was completely satisfactory. Since then, as has been explained, the engineers have been trying to track the installation troubles, which are complicated by the intricate piping system. The fuel is carried in the floats and the wings cool the radiator water, but the oil cooling is arranged differently to the Supermarine. The main oil tank is behind the pilot, and a complete section of the skin of the fuselage here is an oil radiator, with extension pipes to similar flat tube oil coolers on the top of the floats

These may provide more cooling than is needed, but no one is yet sure on that point, nor on whether more radiator surface must be provided It is hoped that the float radiators will be surplus and can be used for water

THE WEEK BEFORE THE RACE has been filled with excitements and thrills, with narrow escapes from disaster to both teams Seaplanes have been rescued in a waterlogged condition; there have been some anxious moments when on calm as well as rough seas Other types have porpoised until it seemed one more seesaw would be fatal, and last of all, one of the four hopes of the British team had such a narrow escape from collision with a barge that it was towed in with its wing tip crumpled.

It was a relief to everyone when Friday morning dawned and for good or ill the choice of the British and Italian teams had to be announced All the world knows now that the British had two of the new Supermarine Rolls Royce Seaplanes, and to the bitter disappointment of the Gloster team had to rely for their third string on the Supermarine-Napier Seaplane of 1927, the type which won at Venice.



Head on view of a British Schneider Trophy Contest entry, the Gloster-Napier

The Italians chose two Macchi 67's, with Isotta Fraschini engines of 1,000 to 1,500 hp., consisting of 18 cylinders arranged in three banks of six, and Major de Bernardis' record breaker with a 1,000-hp Fiat engine and bigger floats to hold sufficient fuel for an hour's flying One Macchi 67 had flown here for 15 min only; the second had never been in the air when the navigability trials had started, and the Italian team worked all night to repair a punctured float in the Macchi 52, which had nearly been sunk earlier in the day. Truly a hectic conclusion to a hectic week, for not until a last flight just before dusk could the British authorities decide whether or no the Gloster-Napier seaplanes were to be included in the team.

The Gloster-Napier seaplane has had a persistent and obscure trouble in insuring a smooth flow of fuel to the engine, which at first tended to cut out from starvation on turns due probably in part to acceleration forces, or an alteration in the air pressure on the air intakes This worried the technicians for days, and at the Napier factory men worked night and day revising the fuel system to insure that a feeder fuel tank, essential to feed the engine during these sharp turns, was always full Then, this difficulty apparently overcome, Squadron Leader R. G Orlebar made a spectacular flight so late that as he took off the lights were aglow in the Yacht cabins in the Solent and the navigation buoys in the shipping channel Never has a high-speed flight been made under such poor light conditions

Still the engine did not have a completely even fuel flow, but enough was learned to track the trouble, or so it was thought, and also to secure valuable data as to cooling areas needed for oil and water The circular oil radiator which forms part of the skin of the fuselage behind the cockpit, plus the oil radiators on the float struts, had proved efficient, but more cooling was needed for the water So an extra oil radiator was fixed each side of the cockpit, unfortunately spoiling the fine body lines, and the float radiators were switched over from oil to water New racing floats were fitted, and the final racing engines installed in both machines This occupied the Gloster team all the week

Interest, therefore, centered in the Supermarine Rolls Royce seaplanes, and these two aircraft had experienced and withstood a degree of rough usage hardly believable in what we are accustomed to regard as delicate high-speed aircraft only to be flown under perfect conditions The designers of this machine had broken new ground in three directions First, no single-engined machine has ever had such high horsepower, and with this was combined a large gear reduction, a slow-moving and heavy propeller, and a much accentuated cooling problem. The high horsepower introduced a very awkward problem of torque, the reaction tending to turn the starboard float when taking off The 1927 racer overcame the much less pronounced torque by putting all the fuel in the other float and offsetting the machine slightly on the floats, but with a more powerful engine requiring a tankage of 100 gal this was out of the question, so originally the fuel was equally divided between the floats.

Very early it was apparent that torque was an important factor and the first time the S 6 was flown at full load disaster was very near Already it had been found necessary to provide greater cooling surface for the water radiators, and extra coolers—thin lozenger studs on each side of the two floats—had added to the overall weight It was desired, too, to use a certain

airscrew and with this Flying Officer Waghorn made six unsuccessful attempts to take off porpoising so violently that he had each time to shut down

GLOOM SPREAD in the British camp, accentuated when it was seen that the seaplane was being towed in very low in the water and with the pilot sitting on one float to balance the machine Still she had kept afloat on a two-mile tow, and everyone was relieved when it was discovered a rubber washer to a float bracing wire had been forgotten and the starboard float had shipped over 300 lb of water.

But the torque problem remained and new floats were built in which slightly more buoyancy was given one float and more fuel transferred to the other An airscrew permitting greater r.p.m. was used, allowing more power to be developed by the engine, and with this Flying Officer Atcherley made a most successful flight, but a curious mishap occurred.

After being in the air for some time, the pilot felt a subtle difference in his controls, landed and to his astonishment found half the aluminium covering of the front starboard float strut torn away, two of the petrol fuel pipes normally covered by the fairing bent at one spot as if by a sudden blow, and even more puzzling, the edges of the broken fairing fused like lead foil in a flame.

All the technicians held a consultation and it seemed that the most likely explanation was that the machine had struck in flight one of the many seagulls always hovering about over the water here The pilot had seen nothing and, of course, knew nothing of what had happened The wonder was that a bird had not been struck before, as no bird could escape an object traveling at 300 m.p.h. There still remained the fused metal and at first it was thought the friction of two pieces of metal in that terrific air blast had generated the heat, or else violent oscillation of a flapping piece This mishap naturally caused more delay and so opportunity was taken to install the final racing engine.

Meanwhile as an experiment to overcome the way the Supermarine had of digging her heels into the water and with a particular airscrew declining to get on her step, two small hydrovanes were fitted to the rear of each float to give greater lift on the water and assist the tail of the float to ride more on the water They succeeded too well in one direction and again disaster seemed near The balance was completely upset for as Squadron Leader Orlebar opened up the engine, the seaplane quickly began to porpoise, so violently that at times the big nose of the seaplane rose like a bucking horse coming down with a resounding smack on the water, seemingly enough to shake the machine to pieces and crush the float struts into the engine directly above. Three attempts proved that no help lay here and as soon as the machine was towed in, these extra hydrovanes were removed

There only remained one solution to a problem in which the float size had been cut to the minimum necessary to allow the machine to get over the hump speed and on to the step A finer pitched airscrew must be taken from the engine, even at the cost of putting extra strain on the power unit This was done and on the last day before the reliability trials, Flying Officer Atcherley took out the seaplane, and had as severe a test as could be needed, with a calm sea and no wind, he opened up the engine, got off in 45 sec. with full load, and all was well

THE OTHER SUPERMARINE SEAPLANE had passed its tests with the same type of floats but without the hydrovanes the previous night But on a straight run in Southampton Water, Flying Officer Waghorn for once made an indifferent landing, bounced like a rocket, crashed down in a smother of foam, porpoised violently and then drifted straight on toward a tug towing two enormous barges Speed boats dashed to the rescue but the tide was rapidly carrying the seaplane, or so it seemed, into the water between the tug and the oncoming barge The pilot jumped out on to a float, and the seaplane swung as if hit, but the high bluff bows of the barge passed on Again disaster was averted at the cost of a dented float and a crumpled wing tip The delicate water radiators escaped and the damage was repaired in a night

Great Britain had now two certain starters, so once again the Gloster-Napier's troubles occupied attention

Turning to the Italian effort, it must be said at once that in two cases, those of the little Fiat monoplane and

See view of an Italian racer, a Fiat powered with a 1,000 hp. Fiat engine

the Savoia twin-engined in tandem monoplane the brilliant originality of Italy was seen at its best but nevertheless one is forced to the conclusion that genius outstepped practical performance The Fiat was a gem of design in which a 1,000-hp engine had been built into a body of surprisingly small frontal area and in which even the pilot was totally enclosed in a cockpit which slides over his head But its wings were so tiny that one can well believe its stalling speed was less than 125 m p h, while its body was so short and its tail surfaces so small that one could equally well believe that it must be exceedingly difficult to control as the sudden crashes of the first two seaplanes of the type suggest But from the point of view of head resistance and all forms of resistance it was a brilliant example of attention to detail, the whole body, floats as well, having the finish of a highly polished car

THE TWIN-ENGINED SAVOIA MARCHETTI was in another category, as it was said to fly easily and comfortably, but it did not look really fast There was a central nacelle, in which the pilot was sandwiched between the two engines in a tiny cockpit and incidentally kept warm by two oil radiators on each side of him The monoplane wings were rather thick in section and were practically all radiator of the corrugated type; each having a very flat bottomed float under it, carried back to the tail to support the outriggers which provided clearance for the rear propeller and supported the actual tail The new features were the engine crankcases of the two 1,000-1,500 Isotta Fraschini engines The lower half was specially moulded to an elongated shape to provide a reasonably good streamline and more novel and brilliant still to act as the engine bearer It was ribbed and stiffened for this purpose and bolted directly to the fireproof bulkhead

Whether weight is saved, it is of course impossible to say, and it means placing all the auxiliaries at one end of the engine, but at least it is a line of development worth examination

The frontal area of the engines on the two Macchis seemed too large for the horsepower, the wings were of a very thick section, the floats seemed overbig and there were many points at which interference losses must have been unnecessarily high It is important to note that there was no gear reduction on the Italian engines, nor was one supercharged

They did not seem too happy on English water, but when they got into the air, they flew well and fast One of them bumped badly on a swell during its trials, shot into the air and came down on one float It was found that a rear bracing wire on the top side of one plane had snapped These, it turned out later, were made of 100-ton steel, far too brittle for such work in British eyes, and in order to replace them a Savoia twin-hulled flying boat made a special trip in one day from Italy to Calshot 900 miles with the spares needed The extra hard steel no doubt accounted for the fracture

Italy frankly admitted that she was not ready and she did not even bring to England the Piaggio, a revolutionary conception of a flying wing, somehow or other adapted to operate off water

THE GENERAL STORY of the race has been told in the news columns [In AVIATION of September 14—Ed] First place went to Flying Officer H R D Waghorn in the Supermarine S 6, who covered the 217 miles at 328 m p h The next two places were taken by two-year old planes but with their standing interchanged from the results at the Lido in 1927 Quartermaster Tomaso del Molin took second in a Macchi M 52 with Fiat engine at 284 2 m p h, Flight Lieutenant D'Arcy Greig took third in a Supermarine S 5 at 282 1 [Greig's rank is equivalent to that of a captain in the American Army A Flying Officer in the Royal Air Force ranks with a 1st Lieutenant here.—Ed]

Only after the race did full data become available on the power of the engines and certain characteristics of the planes The S 6 took off with a weight of 4 500 lb including 130 gal of fuel It was impossible to run the engine continuously at full throttle because of insufficient cooling, and also because the tank capacity would not have allowed covering the course at maximum power and speed The post-race report credited the Rolls Royce engine in the Supermarine with a maximum output of 1,920 hp at 3,050 r p m In the race the r p m were held down to 2 950, at which speed the engine gave 1,850 hp

Twenty-four gallons of water were carried in the cooling system, and about 11 gallons of oil The rate of flow through the oil system was high, the circulation being about eight gallons per minute The cooling area of the surface of the oil tank, which was placed in the fin as already described, was about one square foot for each horsepower dissipated in taking heat from the lubricant

The supercharger used on the Rolls Royce raised the intake pressure by 14 lb per square inch and that was superposed upon an increase of three lb produced by the position and form of the air intake. The problem of disposal of exhaust fumes had apparently been satisfactorily solved on the British planes as there was no report of trouble or of uncomfortable heat in the cockpit

One of the new Italian planes gave trouble with exhaust gas, and Lieutenant Cadringher was finally forced to land for that reason

ALTHOUGH Flying Officer Waghorn was the winner of the race, the best lap time was made by Flying Officer R L. R Atcherley who traveled two laps, a total of 100 kilometers, at 332 49 m p h Atcherley was disqualified for cutting a pylon on his first lap His goggles had come off, and he was flying almost blind at the time For the same reason, his first lap was by far his slowest

Atcherley's advantage in speed over the best lap of his team-mate on the same type of plane appeared to be accounted for by a better radiator, and also by his flying more nearly at full throttle than Flying Officer Waghorn and allowing the water temperature to run up beyond the normal safety level

The winning plane had a very narrow escape from being unable to participate in the race at all In the course of the preliminary trials a broken spark plug entered one of the cylinders and scored it so that a new cylinder block had to be fitted before the race The work was done in four hours on the morning before the start, a remarkably quick replacement upon so specialized a racing engine

The Gloster continued to disappoint, despite its generally beautiful lines The stability proved unsatisfactory, and the carburetor intake which had been satisfactory in bench tests, gave endless trouble when exposed in the slipstream after installation in the plane [A more detailed account of the race, with additional illustrations is planned for an early issue —Ed]

GENERAL NEWS

Aviation Corp. to Build Seaplanes at Baltimore, Md.

BALTIMORE (MD)—Announcement is made by The Aviation Corporation that it has selected this city as the site for its central manufacturing plant. An outlay of $15 000 000 will have been made when the local plant is completed Large seaplanes will be built at this plant The site chosen is on Back River, between Todd's Point and Stansbury Point and extends to and borders the North Point Road. It embraces 508 acres and options on the tract were approved with a purchase price in excess of $500,000

The factory will cover fifteen acres of the site One of the largest wind tunnels ever projected will also be built Designs and plans for a huge all-metal flying boat have been in progress for a year, and the new factory is to be built for its manufacture Although it is expected that a year and a half will be required to construct the first of the planes, the personnel of the factory, it is said, will number more than 1 000

A group of engineers, headed by Duncan Cox of New York, decided upon Baltimore Mr Cox will set up permanent offices in Baltimore and supervise construction.

The Aviation Corporation was formed last spring and owns the Fairchild Airplane Manufacturing Company, and the Fairchild Kreider-Reisner Aircraft Company It also controls or is interested in Colonial Airways Inc., Fokker Aircraft Corporation Interstate Air Service and Universal Air Lines The seaplanes will be used on Aviation Corporation lines

Autogiros Entered in Tour

DETROIT (MICH)—Observers from all branches of the aviation industry will note with interest the records of the three Autogiros which have been entered in the Fifth Annual Reliability Tour starting from the Ford Airport at Dearborn Oct 5 The tour will offer an opportunity for thousands of people to see for the first time the de la Cierva craft Two of them were built by Pitcairn Cierva Autogiro Company of Philadelphia and the third which aroused a great deal of interest at the Cleveland Show, was imported and will be flown by Senor de la Cierva himself.

Continental Teats Satisfactory

DETROIT (MICH)—Air tests of the 160 hp Continental Motors Corporation radial engine have been satisfactorily completed according to C P Russell, aero sales manager of the firm In making the tests the power plant was fitted in several different planes

Orlebar Pilots Supermarine To New Mark of 357.7 M.P.H.

Squadron Leader A H Orlebar

F.A.S.T. to Represent Gnome-Rhone Company

MONTREAL (CAN)—Fast Air Service Transport Company, Ltd, has been named sole distributor in North America for Gnome-Rhone engines. M Weiller, owner and director of Gnome Rhone Aeroplane Motor Company, Paris, France, made this announcement during his present visit to this city A plant is to be constructed, but as yet the site has not been named

Fast Air Service company, furthermore, expects the firm of Aeroplanes Henry Potez, Paris, to establish a plant for its products here. This company offers four and five passenger commercial cabin planes as well as a variety of military models

Societe Anonyme de Construction d' Airports, a French organization, which has been establishing fields all over France, is also expected to undertake developments here

All three projects are reported as part of the F.A S T firm undertaking This line is now using Potez planes

Lycoming Tested in Stinson

WILLIAMSPORT (PA)—Lycoming Motors, this city has installed one of their new nine-cylinder 190 hp engines in a Stinson-Junior plane, according to announcements

Italians Plan Attempt To Recover Record Soon

CALSHOT (ENGLAND) — Surpassing the previous official world's record by more than 35 m p h, Squadron Leader A H Orlebar, flying the Supermarine Rolls-Royce S-6, set a new mark of 357 7 m p h on Sept 12 Two days before, he had covered the required four laps of the course at an average of 355 825 m p h, and had averaged 368 8 m p h, the fastest speed ever attained by man, on one of them If the first average had already been submitted to the F A I, it is possible that it may be taken as the official record, since the rules require that the previous mark must be surpassed by at least 5 m p h before a new record is recognized.

Squadron Leader Orlebar's record was made just five days after Flying Officer H R D Waghorn had retained the Schneider Cup for Great Britain by covering the 31-mi course over the Solent at an average speed of 328 64 m p h for the required seven laps, thus exceeding by about 10 m.p.h the record established in 1927 by Major De Bernardi Orlebar used the same plane which had been flown by Waghorn Another Supermarine S-6, piloted by Flying Officer R L R Atcherley, had made a record of 332 49 m p h for one lap around the four-sided course

"We Shall Beat It"—Bernasconi

While British authorities were frankly disappointed by the failure of the S-6 to obtain the anticipated speed of 370 m p h it was announced that no further trials would be held this year There was further disappointment in the fact that the new Gloster-Napier 6, the 'Golden Arrow'', flown by Flight Lieutenant George H Stainforth, attained a speed of only 336 3 m p h as an average for its best four laps Its further attempts were halted by engine trouble The Golden Arrow was not ready in time to be entered in the Schneider Cup races

The British desire to set a higher record was accentuated by the challenge of Colonel Bernasconi, captain of the Italian Schneider Cup team, who said before leaving England, "Whatever record the English make, we shall quickly beat it" The possible performance of the new Fiat, Savoia and Piaggio planes is problematical, as none of them was ready in time to be entered in the Schneider Cup races and Italy was

(Concluded on next page)

D. A. C. Acquires Parks Companies

Deal Involves Sum In Excess of Million

DETROIT (MICH.)—Parks Air College, Inc., of St. Louis, and its affiliated companies, Parks Aircraft, Inc., and Parks Airways, Inc., have been purchased by Detroit Aircraft Corporation as the Detroit organization's latest division, it was announced here recently by Edward S. Evans, president of the local concern. A sum in excess of $1,000,000 paid for the St. Louis group.

The Parks school, located on a 100 acre airport in East St. Louis, Ill., is regarded as one of the largest flying schools in the United States, holding a Department of Commerce License Certificate. The company's property, on the airport, includes a large modern aircraft factory building, a large brick and steel hangar, used for storage and transient service purposes, a two and a half story brick dormitory building for student pilots, and nine additional buildings housing the administrative offices, class rooms, repair shops and restaurant.

Mr. Evans stated the purchasers contemplated no immediate changes in the general policies of Parks Air College, and that a number of representative St. Louis men will be on the directorates of the various Parks divisions. Oliver L. Parks and Harry F. Mammen are to remain in charge of the St. Louis operations, the announcement said.

Large Student Body

Although Parks Aircraft, Inc., recently went into production on a two-place training plane, the air college has been training its students on open cockpit Travel Air biplanes, OX-5 powered, and one OX-5 Curtiss Robin for cabin plane training work. Parks Airway, Inc., the lesser of the Parks companies, is an aerial taxi service. The college is said to have had an average registration during the past year varying between 750 and 800 students, a large number of whom reside in the dormitory building on the airport.

According to the terms of the agreement signed by the Detroit and the St. Louis organizations, the Parks' directors will request their stockholders to deposit all of the stock in the three Parks companies in escrow in a St. Louis bank. When a major portion of the stock is deposited the Detroit Aircraft Corporation will formally take over the three Parks units. Acquisition of the Parks group gives the Detroit Aircraft Corporation its second large airport and its fifth aircraft factory building.

Fairchild Reports Income

NEW YORK (N. Y.)—For the first six months of this year Fairchild Aviation Corporation reported a business of $1,809,305.56 as compared with $1,219,609.76 for the same period in 1928.

Aerial Map Used In Litigation Case

SANTA BARBARA (CALIF.)—A new use of the aerial map has been found by the Superior Court, this city, which is using a Fairchild map in connection with water litigation now before the legal body. The photo-mosaic chart is 16 ft. in length and represents a territory nearly 60 mi. long and 10 mi. wide. Judge, attorneys, engineers, and witnesses have commended the idea.

Eaglerock Prices Reduced

COLORADO (COLO.)—General reduction of $250 on prices of all Eaglerock biplane models is announced at the factory here by Justin A. McInaney, vice-president in charge of sales for Alexander Aircraft Company. The reduction was made, it is declared, to stimulate biplane sales preparatory to the production of the new Alexander Bullet low-wing cabin monoplane. Placing it in the OX-5 price class, the Eaglerock with Hisso "A" 150 hp. engine is now listed at $3,250. Other models are priced as follows: OX-5 Eaglerock (less power plant and propeller) $2,000, Comet Eaglerock, $5,247; Challenger Eaglerock, $5,859; Wright J-6 165 hp. Eaglerock, $5,597; and Kinner Eaglerock, $3,907.

Orlebar Sets Record

(Concluded from Page 617)

represented only by two new Macchi seaplanes which were forced to land after covering one lap each and another Macchi which had been flown in the 1927 races.

All of the members of the victorious British team have been granted long leaves, and it was announced that in all probability none of them would be on the team which will be chosen to defend the Schneider Cup in 1931. Lord Thomson, British Air Minister, explained that it is the British policy to develop the Air Force in general rather than particular stars, and that many other pilots would be anxious for the opportunity to compete.

Cities Bid for Imperial Derby

TORONTO (CAN.)—Strong bids for selection as terminus site of the proposed Imperial Oil Company's "$50,000 Imperial Air Derby" planned to be run initially next year from a United States airport to one in Canada, are being received from several cities in eastern Canada. Windsor, London and Toronto have entered in competition with Montreal for the honor.

Hawley Offers Prize For Ballooning Record

ST. LOUIS (MO.)—A prize of $500 for the pilot breaking the American distance record of 1,173 mi. has been offered the nine entrants in the international balloon race here Sept. 28 by Alan R. Hawley, referee of the event, who with Augustus Post set the record in 1910 by a flight from St. Louis to Northern Quebec. The $500 is in addition to the $3,000 offered by the Air Board of the Chamber of Commerce to the winner of the event, together with possession of the third Gordon Bennett trophy for a year. The race is to get under way at 4 p.m. from the grounds at 8900 South Broadway. The bags will leave at five-minute intervals.

Foreign entries in the contest are announced as follows: Denmark balloon "Denmark," piloted by Georg Schenstrom; Germany, balloons "Bremen," piloted by Hugo Kaulan, Jr., and "Stadt Essen," piloted by Erich Liemkugel; Belgium, balloon "Belgica," piloted by Capt. Ernest Demuyter, with Franz Lecharlier as aide; Argentina, D. Eduardo Bradley; France, Georges Blanchet. France had two entries initially, but one has withdrawn, leaving but nine entries in the race.

Record S-6 Had Reed Propeller

NEW YORK (N. Y.)—A metal propeller of S. A. Reed's design was used on the Supermarine Rolls Royce S-6 flown to victory in the Schneider Race and later to a new world speed mark of 357.7 m.p.h., it is pointed out here by the Curtiss organization. The airscrew used was of the Fairey-Reed type, manufactured in Britain by Fairey Aviation Company, Ltd., under a license from Mr. Reed. Every winner of the Schneider Cup since 1923 has used a Reed metal propeller, it is stated, the S-6 and S-5 planes employing the "D" type with twisted center, a model no longer manufactured in this country. United States rights to the Reed propeller are held by the Curtiss-Reed Propeller Company, department of Curtiss Aeroplane & Motor Company.

Begin Waco Plant Addition

TROY (OHIO)—Work has started on the new addition to the Waco Aircraft Company's plant here, which will greatly increase the floor space of the factory. The new building will be 44 ft. wide and 285 ft. long. It will be built of steel and concrete, following the same type of construction as was used in the present factory building. The building, which is being erected by the Dayton Structural Steel Company, will be ready for occupancy within 90 days.

Five NB-3's to Western Branch

LOS ANGELES (CALIF.)—Western Branch of Nicholas-Beazley Airplane Company, Inc., of which George O. Wheeler is manager, is receiving a shipment of five Barling NB-3 planes.

American Aeronautical Now Controlled by Allied

NEW YORK (N. Y.)—It has been announced that Allied Motor Industries, Inc., has acquired control of American Aeronautical Corporation, American manufacturer and distributor of Savoia-Marchetti seaplanes and amphibions. Allied Motors, in addition, is affiliated with Great Lakes Aircraft Corporation and American Cirrus Engines, Inc.

William R. Wilson, president of Allied, becomes chairman of the board of directors of American Aeronautical Corporation, with the following members: Temple M. Joyce, vice president of Berliner-Joyce; Col. B. F. Castle, president of Great Lakes Aircraft; Edward A. Naar, vice president of Allied; N. H. Van Sicklen, president of Van Sicklen Corporation, an Allied subsidiary; Capt. H. C. Richardson, U. S. N. retired, engineering consultant to Allied; Enea Bossi, president of American Aeronautical Corporation; Ugo D'Annunzio, vice president of American Aeronautical; F. A. Stevenson, vice president of American Car Foundry; Charles E. Proctor, retired capitalist; and Paul G. Zimmerman, vice-president of American Aeronautical.

American Aeronautical Corporation, organized in 1928, will retain its identity with respect to the manufacture and sale of the three types of Savoi-Marchetti planes: Baby Amphibion S-56, three place biplane powered by Kinner, 100 hp. engine; seven passenger biplane amphibion S-62 powered by Isotta-Fraschini 500 hp. engine, and the 14-passenger double-hull monoplane flying boat S-55, using two Isotta-Fraschini 500 hp. engines in tandem. These types are in production at Whitestone, L. I., but will soon be shifted to the new plant at Port Washington, L. I., N. Y.

Allied Motor Industries, Inc., now control the authorized American Aeronautical Corporation capital of 150,000 class A no par-value stock, of which 93,323 shares are outstanding; and 500,000 shares of class B no par value common stock, with 346,661 shares outstanding.

Curtiss Buys 100 Thermopetes

LOS ANGELES (CALIF.)—All Curtiss planes built hereafter will be equipped with flanges for Thermopetes, according to a recent announcement from Aviation Accessories Corporation. The Curtiss company has also ordered 100 Thermopetes for installation in its planes. Thermopete is an oil warming device which is said to cut considerable time in warming up engines prior to takeoff. Aviation Accessories is a division of Allied Aviation Industries.

Increase Wallace Production

KANSAS CITY (MO.)—Production on the Wallace Touroplane, now manufactured by Wallace Aircraft Company, division of American Eagle Aircraft Corporation, has been stepped up to three planes a week.

America's Largest—The New Fokker F-32

ANTHONY H. G. FOKKER's new 32-passenger transport is shown above about to arise in test flight. The veteran designer's latest model is powered with four Pratt & Whitney "Hornet" engines with two power plants fitted in tandem beneath each wing. Craft of this type will be employed by Universal Air Lines.

Stinson Reports Deliveries

WAYNE (MICH.)—The Stinson Aircraft Corporation reports the recent delivery of eleven Stinson Junior monoplanes. Six of the planes were powered by Wright J-6 225 hp. engines, three with the Wright J-6 165 hp. engine, and two with 425 hp. Pratt & Whitney Wasps. One of the planes was equipped with Fairchild floats.

Alaska-Washiogton Takes Over Inter-City

SEATTLE (WASH.)—Alaska-Washington Airways has taken over the properties, route and operation of the Inter-City Airline, Inc., which was founded last June by W. G. Taggart. Taggart secured a $45,000 stock interest in the Alaska-Washington company in return for his Inter-City properties and has been elected a member of the board of directors of the larger company.

The Inter-City began operations between Yakima and Wenatchee, Wash., with one plane piloted by Don Phillips, but patronage soon necessitated a second plane, piloted by Clark Wing, being placed in service.

Alex Holden, vice president and general manager of the Alaska-Washington company has assumed the direction of the new service which connects with Mamer Air Service, operating to Spokane, Portland and Walla Walla.

Curtiss Offers Fast Mail Plane

NEW YORK (N. Y.)—Curtiss Aeroplane & Motor Company has developed a new air mail plane, known as the "Carrier Pigeon II," which will carry 2,000 lb. pay load at a maximum speed of 151 m.p.h., according to company officials. Test flights have been conducted at the company's experimental plant at Garden City, L. I. The new plane is powered with a Curtiss Conqueror. It uses a Curtiss-Reed three-bladed adjustable metal propeller.

Air Jurisdiction Case To Canadian High Court

OTTAWA (ONT.)—A reference from the Dominion Government respecting air rights of the Dominion and the Provinces is first on the list for the autumn term of the Supreme Court of Canada which is to commence its sessions shortly. The Federal authorities are asking the Court to decide whether they have complete jurisdiction in Canada over flying operations of private companies or others, or whether the provincial governments have certain rights.

The reference arises from certain occurrences in the Province of Quebec some time ago when Federal authorities interfered with a provincial enterprise and provincial pilots who were flying only in the Province of Quebec.

The Premier of Quebec contended that the provincial government had jurisdiction and the reference to the Supreme Court to decide whether the Dominion or the provinces have control over aviation or whether both have a certain amount of control. The provinces invoked the law respecting the provincial rights.

Quarantine at Canada Border

OTTAWA (CAN.)—For aircraft entering Canada, additional regulations have now been issued, according to A. H. Tiemann, here, assistant trade commissioner.

It is provided that: "Aircraft arriving in Canada from foreign or overseas countries subject to the same exemption as set forth in Section 13 of these Regulations regarding ocean-going vessels, are required to undergo quarantine inspection on arrival, before being allowed to make customs entry." It is understood that aircraft are so subjected unless operated exclusively between ports of the United States and ports of Canada. The Regulations are similar to those applicable to ocean vessels.

All-Nebraska Air Tour Closes

Smooth Operation Marks Journey of 26 Airplanes

OMAHA (NEB.)—The first All-Nebraska Air Tour ended last Saturday evening, termed a complete success. For the six days of the trip, the combined cross-country mileage of the planes was put at 25,000 mi. This figure does not include the hundreds of barnstorming "hops" and demonstrations at the various fields.

The diversity of planes and variety provided in the aero show was pleasing. Planes that participated included one Ford tri-engine, one Lockheed-Vega, one Bellanca, one Fokker Super-Universal, two Ryans, two Travel Air monoplanes, six Travel Air biplanes, one Cessna, one Waco, one Gipsy Moth, two Monocoupes, one Overland Sport Trainer, two Arrow Sports, three Curtiss Robins, one Stinson Detroiter, one Lincoln PT, one Swallow TP, one Great Lakes Trainer and one Douglas observation plane. There were more than 25 planes in the tour. Instead of dwindling down to a mere handful of planes at the last stop as some tours have done, the First Nebraska tour brought 26 planes to the final exhibition field.

Commanded by Major Houghland

The smoothness of operation during the length of the tour was largely due to the fact that an Army officer, experienced in this manner of work and entirely free of commercial connections, was made flight commander. Maj. H. J. Houghland, air officer for the Seventh Corps Area, handled the trip.

Crowds varied from three to ten thousand persons and it is estimated that an "audience" exceeding 75,000 persons saw the flying show.

All passenger and barnstorming work went off without mishap, despite a few forced landings, but the week was marred by one fatality when a pilot crashed in a small sport plane.

The Nebraska tour was for the sole purposes of creating air consciousness in this state and particularly for the promoting of airports and airport facilities. It was proposed by The Omaha *World-Herald*, which also sent out the pathfinding plane. The tour idea was taken up by the Omaha Chamber of Commerce and made possible through this organization, and through the fine co-operation of airplane owners and pilots and cities throughout the state.

Postpone Southwestern Show

DALLAS (TEX.)—Postponement to some future date of the Southwestern Aircraft Exposition, planned for the State Fair of Texas, which will be held here Oct. 12-27, is announced by Royal C. Miller, managing director. The reasons given are circumstances over which the air show group had no control, and inability to provide a suitable building in time for the Fair.

Cuba Dealer for New Standard

PATERSON (N. J.)—Cuban Aviation Corporation has been appointed dealer in the Republic of Cuba and adjacent islands by New Standard Aircraft Corporation, this city. Delivery on the first plane of the contract, a Whirlwind-powered Model D 25, was made at Roosevelt Field, Long Island, according to George Daws, New Standard sales manager. From Long Island it will be flown to Cuba.

Berliner-Joyce Firm Building Service Planes

BALTIMORE (MD.)—Although Berliner-Joyce Aircraft Corporation has been in existence but a comparatively short time it has already received contracts from the Army and Navy totalling $300,000. Berliner-Joyce submitted designs which won a contract for the construction of a two-seat pursuit plane for the Army, according to the reports. The design brought out by the firm's engineering personnel in Baltimore, calls for a craft of metal throughout, an engine made by the Curtiss company, and high speed and high altitude capabilities. Work on the experimental machine is now in progress.

A single-seater is also underway—a craft for which speed, maneuverability, and high visibility is promised. Racing lines will be a feature of this plane. Duralumin will be used nearly throughout.

For the Navy, a two-place observation plane for catapult use is being developed. One hundred stainless steel floats for existing training planes are also being built.

Birdseye Heads Air Map Firm

WASHINGTON (D. C.)—Commercial air mapping will be begun next month by the newly-established Aerotopograph Corporation of America. Col. C. H. Birdseye, recently resigned as chief topographic engineer in charge of mapping activities of the U. S. Geological Survey, is president of Aerotopograph company, and has assumed active charge of setting up the offices, drafting room and photographic laboratory in the Architect's Building here. E. O. Messter, president of Aerotopographie Company of Dresden, Germany, is vice-president of the American company. German instruments and methods will be used, but there is no financial connection between the two concerns. Mapping will be done by the Hugershoff method. Aerotopograph is a subsidiary of Federal Aviation Corporation, New York City.

Fairchild for Cleveland News

CLEVELAND (OHIO)—Delivery has been taken here by the Cleveland *News* on a Wasp-powered Fairchild 71 for use in advertising as well as various emergency purposes. The local paper follows the idea of the Des Moines, Ia., *Register-Tribune* which has flown a Whirlwind Fairchild FC-2 for a year.

Simmons to Export Watkins Firm Planes

WICHITA (KAN.)—Officials of the Watkins Aircraft Company report the closing of a contract with the Simmons Aircraft Division of Steel, Inc., Los Angeles exporters for a minimum of 330 airplanes valued at $1,000,000 to be delivered over a period of five years. Major Peterson, sales manager for the Simmons division, handled the deal for the Los Angeles firm.

All planes to be delivered under the contract will be exported, according to terms of the contract. The order will in no way interfere with development of the American market by the Watkins concern. Officials of the Watkins company expect to start delivery by Jan. 1. Most of the planes, according to Major Peterson, will go to China, Mexico and South America.

The Watkins company, only recently organized, builds a two-place low-wing monoplane carrying LeBlond power. It was designed by W. C. Cummings. The Watkins plane, known as the Skylark, was shown at the recent Cleveland show. R. D. W. Clapp is president of the Watkins company.

Begin Northrop Factory

BURBANK (CALIF.)—Construction of a $100,000 factory for the newly formed Northrop Aircraft, Ltd., division of United Aircraft & Transport, has been started at United Airport, now under development here. The factory is expected to be ready for production in November with about 100 employees on the payroll. Northrop Aviation, Ltd., was licensed recently, following the purchase of Avion Corporation by United interests. Development of a new all-metal type cantilever monoplane has been completed by the Avion Corporation, of which John K. Northrop was chief engineer, and it is thought this will be the first plane to be placed in production. Features of the plane are its retractable landing gear, mounting of the tail surfaces on outriggers from the wing, and the carrying of pilot, passengers, and pusher type engine in the streamlined center section of the wing.

Plan Universal Parts Export

ST. LOUIS (MO.)—Negotiations are being made by the sales division of the parts and supply department, Universal Aviation Corporation, Lambert-St. Louis Flying Field, with several export concerns for representation as agents for Universal, according to Hays Walter, sales manager. One export representative recently placed orders with Universal for supplying a government in a Latin-American country. The Universal supply department plans to build up an extensive export trade through representatives. The stock room of Universal lately has undergone a complete transformation. All out-of-date material has been discarded and replaced by new aeronautical parts.

Secretary Good Against Bonds for Army Flights

WASHINGTON (D. C.)—Disapproving the House Bill introduced by Representative M. J. Maas (Rep.) of Minnesota, which was to provide for the compulsory bonding of private individuals for any damage done by Army planes in exhibition flights from other than Government fields, Secretary of War James W. Good has issued a statement to the effect that such bonding is believed no longer necessary.

The Maas Bill would simply make permanent the temporary legislation now in the annual appropriation acts, said the Secretary. The War Department feels, he declared, that towns and cities promoting exhibition flights should not be asked for bonds, for it is believed that the probability of accident is rapidly decreasing due to the improvement in aircraft and experience and caution gained by Army pilots.

In display participation of Navy aircraft, no such bond is required, it is pointed out.

Dayton Offering New Engines

DAYTON (OHIO)—Plans for volume production of two new airplane engines, construction of a new factory building, and installation of equipment to cost approximately $750,000 are announced by officials of Dayton Airplane Engine Company, this city. The company, which at present manufactures Dayton "Bear" four-cylinder airplane engines, has completed plans for manufacture of six and eight-cylinder power plants with twin cylinder blocks opposed at 180 deg. The new six-cylinder engine will develop 225 hp., it is said, and the eight-cylinder, 350 hp.

ZMC-2 Flown to Lakehurst

LAKEHURST (N. J.)—The ZMC-2, all-metal dirigible built for the Navy by Aircraft Development Corporation of Detroit, arrived here Sept. 12 after flying from Detroit in about sixteen hours. The airship was under the command of Capt. William Kepner of the Army, as it has not yet been formally accepted by the Navy. When tests have been completed and it is officially taken over it will be used as a training ship for crews which have completed their ground work but have not had previous air training.

Timm Firm Seeks Plant Site

LOS ANGELES (CALIF.)—Timm Airplane Corporation, this city, is seeking a site for the erection of a $500,000 factory for production of the Timm Collegiate monoplane recently approved by the Department of Commerce. Abandonment of the present site is made necessary by rising land values which render future expansion impractical, and by the lack of test field facilities at the present location.

Fly Pontoon Glider from Lake

DETROIT (MICH.)—What is said to be the first successful glider flight from water in this country took place here recently on Lake St. Clair, off Grosse Pointe Village, when Oscar Kuhn, test pilot for Gliders, Inc., Orion, Mich., took off after being towed behind a motor boat to a 425 ft. wire cable. With the boat attaining a speed of 25 m.p.h., the glider arose from the water. At 35 m.p.h. an altitude of approximately 200 ft. was reached, following which the craft was disengaged to glide down to the lake for a landing on its pontoons. William E. Scripps, Jr., president of Gliders, Inc., who piloted the speed boat, will try other flights with longer cables.

Ignition Shielding Developed

BOONTON (N. J.)—Aircraft Radio Corporation, this city, in co-operation with Rome Wire Company and American Bosch Magneto Corporation has developed a system of ignition equipment shielding designed to suppress interference with beacon receivers and provide ample ventilation to prevent spark plug difficulties. The wiring harness of the device is made by the Rome firm, while the plug shields are made by American Bosch and are so constructed that they may be removed readily. Aircraft Radio Corporation is one of the Boonton associates, which group includes Radio Frequency Laboratories and Boonton Rubber Company.

Nepco to Winter in Florida

WISCONSIN RAPIDS (WIS.)—Nepco Tri-City Flying Service, Inc., this city, which operates one of the largest airports in Wisconsin, will move its complete school of flying to St. Petersburg, Fla., on Dec. 15 for the winter months, with return to the home port scheduled for April. The Challenger and Robin planes used for instruction will be taken along, including the Ford tri-engined machine, which will be used for special flights over the Florida city and for cross-state work. Nepco, of which Capt. L. G. Mulzer is general manager, is dealer for the Fairchild and Curtiss line of planes and also for Pioneer instruments and Meyrowitz goggles.

Arkansas Tour Sept. 24-26

LITTLE ROCK (ARK.)—Sponsored jointly by the local chamber of commerce and N.A.A. chapter, Arkansas' second annual air tour is scheduled for Sept. 24-25-26. Planes in the tour, some of which will be entered by Little Rock, Fort Smith, and Pine Bluff organizations, will be limited in number to 25, according to the committee. In the first tour last year, eleven towns were visited by 16 planes carrying 25 passengers and pilots. Capt. Robert H. Baker, operations officer of the 154th Observation Squadron, A.N.G., will command the tour, the itinerary for which is being arranged as we go to press.

Curtiss Will Train Native Chinese Pilots

NEW YORK (N. Y.)—Four Curtiss Fledgling training planes will be shipped Oct. 1 from the company's plant at Buffalo, N. Y., to Shanghai, China. They will be used to train Chinese pilots, with a view to having native fliers attached to as many transport planes as possible on Chinese lines. Training of the same type offered at the 40 bases of Curtiss Flying Service in the United States will also be given to Chinese and foreign residents who wish to learn to fly.

Plans announced by John S. Allard, vice president of Curtiss Aeroplane Export Company, include the establishment of mail and passenger routes in China covering approximately 3,000 mi. per day, with 35 or 40 planes in service. Three Keystone-Loening amphibions are already in Shanghai, as the nucleus of a fleet of five which will be used on the Yangtse River run between Shanghai and Hankow, the first line which will be opened. Four radio stations are being constructed on this run, two intermediate and one at each of the terminals.

N.-B. Firm Opens Dope Plant

MARSHALL (MO.)—With a design which is claimed to be both fire and explosion proof, a new $40,000 covering and dope plant, 50 x 150 ft., has just been put into operation by Nicholas-Beazley Airplane Company here. Four pent houses equipped with exhaust fans are expected to effect a complete change of air every 30 sec., and another pent house is equipped with coil radiators and driers which heat the incoming air to 90 deg. and give it the correct moisture content. Specially designed stands and other labor-saving devices have also been installed to facilitate the work of covering and doping. The building has no open wiring.

Fokkers for Hawaii Service

HASBROUCK (N. J.)—Purchase of two Fokker F-10 planes by Hawaiian Airways Company, Ltd., for use in the inter-island service in the territory of Hawaii is announced here by Fokker Aircraft Corporation. Line officials expect to have the service in operation by Nov. 10. The main run of Hawaiian Airways Company, Ltd., will be between Honolulu on the Island of Oahu and Hilo on the Island of Hawaii, a distance of 225 mi. The planes will make the round trip in 4 hr., a saving of 20 hr. over the present steamship schedules.

Bond Salesmen Use Plane

ST. LOUIS (MO.)—Love, Bryan & Company, investment bankers, are using a J-5 powered four-passenger cabin Monocoupe for the convenience of their salesmen, and as a means of arousing interest in the investment possibilities of the aviation industry. The plane has been touring Illinois

Northwest Line Control Goes to Twin City Group

MINNEAPOLIS (MINN.)—Through purchase of stock in Northwest Airways, Inc, formerly held by Detroit business men, control of the airline has passed into the hands of a group of Twin City business men and bankers

With two exceptions, the entire officer and directorate personnel has been changed. A. R Rogers, Minneapolis lumberman, is chairman of the board of directors, while R C Lilly, president of the First National Bank of St. Paul is president. Other officers are Col L. H. Brittin, retained as vice-president and general manager; H. C. Piper of Lane, Piper & Jaffray, Minneapolis investment house, vice-president, Julian B Baird, vice-president of the Merchants Trust Company of St. Paul, secretary and treasurer, and C A Gunderson, assistant secretary and treasurer

Stock in the company, the first airline in the country to establish joint air-rail service, has been divided equally between Minneapolis and St. Paul shareholders. Executive offices are in St. Paul

Members of the board of directors are Mr Rogers, Mr Piper, Rufus R. Rand, Jr, H R Weesner, F T Heffelfinger, G Nelson Dayton and R F. Pack, all of Minneapolis Mr Lilly, Mr Brittin, J. M Hamaford, Jr., C. E Johnson, George K Gann, Roger B Shepard, Paul J Kalman, L. J Shields and Frank B Kellogg former United States Secretary of State, all of St. Paul, and William B Mayo of Detroit Mr Mayo, chief engineer of the Ford Motor Company, is the only Detroit man to remain on the board

Was Founded in 1925

The Detroiters, among them Mr. Mayo, Frank W Blair, president of the Union Trust Company; Harold H Emmons, attorney; William E. Metzger, automobile magnate, and Eugene W Lewis, banker, organized Northwest Airways, Inc in 1925 to take over the air mail line abandoned by Col Charles Dickinson

Universal Air Lines and Transcontinental Air Transport continue as minority stockholders. The purchase of Northwest Airways was handled in Minneapolis by Lane, Piper and Jaffray, and in St Paul by the First St Paul Company

The policy of Northwest Airways will be the development of aviation, air mail and passenger lines in the northwest states. Expansion of terminal facilities at both Minneapolis and St. Paul is now under way, while additional lines, including one to Winnipeg, are being considered.

Approximately 70,000 sq ft of ground at the St Paul airport has been leased from the city by Northwest which plans to erect thereon a $100 000 hangar machine shop and office building. The lease, approved by the St. Paul city council, runs for 30 yrs. Construction work will start shortly

Paulin Offers New Altimeter

LOS ANGELES (CALIF.)—A new combined level flight indicator, altimeter and barometer has been developed by The American Paulin System, Inc, which is said to be so sensitive that it will give immediate visual record of variations of 10 ft. in altitude It is expected that this instrument will be of special value in aerial photography work as well as in general "blind" flying

Newspaper Plane Fitted for Reporters

DETROIT (MICH) — The Detroit *News* has purchased a Lockheed Vega cabin monoplant, which has been equipped as a flying press room for use of reporters and photographers The plane, purchased through the Schlee-Brock Aircraft Corporation Detroit, was flown here by James V Piersol, aviation editor, and Frank Byerley, of the Schlee-Brock organization.

OX Altitude Record 19,593 Ft.

BRIDGEPORT (CONN) — Milton Hanon, manager of the Bridgeport Airport at Stratford, operated by the Curtiss Flying Service, has been notified by the N.A.A that he had established a new world's altitude record for airplanes powered with Curtiss OX-5 engines Hanon made his record flight in a Curtiss OX Robin cabin monoplane at the Bridgeport Airport on Aug. 24 The new record, according to his official barograph resding, is 19,593 ft. The previous record was 18,660 ft. established by P H Spencer, also a Curtiss pilot, in a similar plane at Boston, Mass

Time Payment for Great Lakes

CLEVELAND (OHIO)—A time payment plan for the sale of Great Lakes aircraft has been adopted, it is announced with the system optional with the various dealers and distributors representing the company A nominal interest charge is to be made and payments extended over a period of twelve months Contract was made with the Great Lakes firm by Merchants & Manufacturers Company through its newly organized aeronautical time payment department, according to a statement by Arthur Greene, president of the latter concern.

Montreal Plans Derby Oct. 5-6

MONTREAL (CANADA)—The Montreal Light Aeroplane Club is planning an Air Derby to be held Oct 5 6 in connection with the arrival here of the planes entered in the Ford Reliability Tour

Schools & Colleges

University of Southern California has opened a series of evening classes in aviation subjects under the supervision of the University's Metropolitan College, Los Angeles. Members of the faculty include Edward N. Sweitzer, Earl W. Hill, and Clarence S Williams

Spartan School of Aeronautics, Tulsa, Okla., has opened a cafeteria at its school headquarters adjacent to the Tulsa Municipal Airport The cafeteria will seat 75 persons. Courses in night flying have been added to the curriculum of the Spartan School Under the direction of Mrs. Mae Haizlip, a special class at the school will be opened for women.

Black-Foxe Military Institute, Los Angeles, plans to establish a complete ground school course this fall.

Van Hoffmann School, St. Louis, Mo., let a contract to the B Russell Shaw Company for an additional student residence accommodating 60 persons to take care of the increased enrollment since the first residence hall was completed recently

Curtiss Flying Service, New York, N. Y., started its first women's class in flying instruction at New York University on Sept 16. One of the features will be the practice and operation of the controls, using a model plane in the 6-ft. wind tunnel

Flo School of Flying Ann Arbor Mich, reports the completion of 18 mo of operation without a single injury to any student Many business men are enrolled in the course, it is reported.

Boeing School of Aeronautics, Oakland, Calif, has received the first three Boeing training planes for use in its flying courses starting Sept. 16 This machine is powered with a Whirlwind Five the other two with 150-hp Axelson engines

Curtiss Flying Service Los Angeles Municipal Airport started its first ground school classes Sept 9 Flying courses were due to start Sept. 15 under the direction of Capt Peyton Gibson Other members of the faculty are Capt. Frank Jansen in charge of meteorology and navigation, Lieut W A Hammond, engines, rigging and the theory of aerodynamics, and Frank Miller, meteorological department.

Brooklyn (N Y.) Polytechnic Institute will include two new courses on the application of the Diesel engine to aircraft in its curriculum opening Sept 24

University of Oklahoma at Norman through its College of Engineering will include courses in aeronautical engineering for juniors and seniors, it is announced. Clinton D. Case, formerly of Nebraska University, will be in charge

Pittsburgh (Pa) High School will include a course in aviation beginning with the second semester in February, if present plans are followed out.

PERSONNEL

Allan Lockheed has been named on the advisory board of the Aircraft Finance Corporation of American Others recently added to the board include Brig-Gen Theodore C. Lyster, Phil H Brockman, director of the Franklin-American Trust Company, St Louis, William G. Bonelli, a director of the Pasadena Aircraft Corporation, Ltd, and Ralph H. Buck, of Glendale, Calif.

Harry F Guggenheim, president of the Guggenheim Fund for the Promotion of Aeronautics, has been appointed Ambassador to Cuba.

Col C H Birdseye, chief topographic engineer of the U S. Geological Survey, has resigned to take over the position of president of the Aerotopographic Company of America, Architects' Building Washington, D C.

Dr. Edmond H. Padden, flight surgeon for West Coast Air Transport, has been appointed surgeon for the Boeing School of Aeronautics, Oakland, Cal, Pacific Air Transport and the western division of Boeing Air Transport, effective October 1. He graduated from the Army School of Aviation Medicine at Brooks Field, in 1927, and since then has specialized in medical aspects of aviation.

Capt Wiley B Wright, formerly Aeronautics Branch inspector in Montana, Idaho and Wyoming, has begun his work as inspector in the Oregon and Washington territory

F. W. Williamson, J C. Willson, D. M Schaeffer, W. B. Mayo, C C. Mosbley, Paul Henderson, C M Keys, and R. W. Millar, have been added to the board of directors of Maddux Air Lines, subsidiary of Transcontinental Air Transport.

Gordon Kuster has been appointed Birmingham, Ala, manager of Delta Air Service

Frank M Ward, formerly of the Air Corps and operator of the Southeastern Airways School at Huntsville, Ala., has been appointed to the faculty of the Braley School of Flying

Ward T. Van Orman famous balloonist, has been selected director of the ground school of the Goodyear-Zeppelin Corporation, which will offer training in ballooning, airship handling, meteorological radio and navigational work

Merrill H Grix formerly of the Stout division of Ford Motor Company, is now superintendent of maintenance of Southwest Air Fast Express, Tulsa, Okla.

Harold O Malcom has been appointed chief draftsman of the Spartan Aircraft Company. He was formerly with the Parks Aircraft Company, St. Louis in a similar capacity.

John C. Moore has been appointed sales representative for Spartan Aircraft Company on the Pacific Coast

Shields Maxwell has been made district passenger agent for New York of the Western Air Express Homer Merchant, formerly district passenger agent at Salt Lake City, has been made general traffic manager of West Coast Air Transport affiliated with Western Air Express, his post at Salt Lake City will be filled by P. O. Lee. Robert Beggs has been appointed general traffic manager for Mid-Continent Air Express, also affiliated with Western Air Express. His previous position as district passenger agent for W.A.E. at Albuquerque will be taken by Nelson Glass

J H Holley, formerly chief test pilot for the Holley Carburetor Company, has been appointed operations manager for Schlee-Brock Aircraft Corporation Holley flew in the R.F.C during the World War

B P. Vlast, of the Duncan Airways of Cleveland, has been appointed district sales manager by the Arrow Aircraft and Motors Corporation for Arrow Sports in the north-central states

W E Wright, formerly with the R.A.F., has been named director of the Boeing School of Aeronautics shop department

Ralph A Reed, a member of the pilot staff of Stout Air Services, Inc, for more than two years, has been made chief of the nine Stout pilots

Edward S. Carter, of Pittsburgh, has been appointed clerk in the traffic department of Transcontinental Air Transport at Port Columbus.

Capt C E McMillin of Dayton, Ohio, has been named chief pilot of the new air line operating out of Atlantic City, N J., under the management of the Delaware and Atlantic Air Corporation

Lieut Carl A Dixon, former manager of L.&H. Aircraft Corporation of Hartford, Conn., has been appointed sales and demonstration pilot of the New Standard Aircraft Corporation, Paterson, N. J. Dixon was a member of the R F C. during the World War

James G Adams New York operations manager of the La Roue Airways, has been appointed superintendent of operations at the Buffalo Municipal Airport.

William Monday has joined the Ryan division of the Detroit Aircraft Corporation as pilot of the Ryan West Coast demonstration ship

Robert Everett has been transferred from the Robertson division, Universal lines, at St. Louis, to Garden City, Kan, where he will be chief mechanic.

William B. Randall, recently of the Angleus Aero Corporation, of Los Angeles has joined the St. Louis-Universal Flying School as chief flying instructor He succeeds Ross Mahachek, who will take the corresponding post at the Kansas City-Universal School

E F Elderton, formerly of Canadian Vickers Ltd, Montreal has been appointed chief engineer of the Boeing Aircraft Company of Canada, Ltd

Maj Vincent B Dixon formerly of Langley Field, Va., has been appointed manager of the Newark (N. J.) Airport.

TRADE TIPS

It has been reported that

St. Petersburg, Fla is taking bids for construction of an airplane hangar for small airships, both to cost a total of about $55 000 The hangers will be located at the Albert Whitted Airport E. H. Lewis, director of Public Works, is in charge of the contracts

B T Conwell, Jr, president of Eternit, Inc, asbestos shingle manufacturers, a new student at St Louis-Universal Flying School, plans to buy a plane for business trips L. E. Fisher, president of the Illinois Light & Power Company, also is considering the purchase of a plane for his personal use

The Palmetto (Fla.) Aero Club is planning to open a landing field for planes to conform to the latest government specifications

The California Aviation Club is taking bids through A C Semrow, 410 Douglas Bldg, Los Angeles, Calif., for construction of aviation club buildings on the corner of National and Sawtelle Boulevards, near Santa Monica, Calif, including a three story clubhouse, 60x180 ft, and four hangars, 120x120 ft., repair shops, turfed landing field and paved take-offs

Lincoln Airways, of Lincoln Auto & Airplane School, 2415 O Street, Lincoln, Neb, is having plans prepared for construction of one 80x100 ft. hangar at the Municipal Airport, to cost about $30 000

County Commissioners are about to let the contract for construction of a hangar at Thomas Field, Tacoma, Wash, to be known as Hangar No 1 F Campbell, Jr, is county auditor and clerk of County Commissioners.

Dr. E. S Pauley, 315 St. Louis Ave., Springfield, Mo, and C. A Dickerson, clerk, are taking bids on erection of an administration building at the Springfield Municipal Airport, to cost about $15,000

Representatives Named

Ryan—Main Aeronautics Company, of Pittsburgh, Pa, for Pennsylvania

Berryloid—Thompson Aeronautical Corporation Cleveland, for the northern half of Ohio and all of Michigan

Barling NB-3—Jeff Warren, Los Angeles Calif for Arizona and southern California.

Curtiss Flying Service — Nepco Tri-City Flying Service, Inc., Wisconsin Rapids, Wis.

Dedicate N. Y. Seaplane Port

PORT WASHINGTON (N. Y) — The New York Seaplane Airport and manufacturing plant of the American Aeronautical Corporation was dedicated September 14. This company, manufacturer of the American Savoia-Marchetti seaplanes and amphibions, now is associated with the Great Lakes Aircraft Corporation and American Cirrus Engines, Inc

BRIEFLY

The East St. Louis and Suburban Railways Company, covering a wide territory around St Louis, is acting as official agent for the Universal Aviation Corporation, making available for passengers on its line complete information about tickets and schedules of the Universal lines

Of the 173 planes owned in Texas, more than one-third belong to the Southern Air Transport

Mills Field, San Francisco, Calif., activities increased considerably in August over July with about 2,576 flights and landings with 3726 passengers recorded. The revenue for the month was $1,722.61, an increase of $430.29 over July

The Louisiana State Chamber of Commerce will sponsor a move encouraging the development of air lines and airports throughout the state

The Superior Aircraft Corporation, Kansas City, Mo., has leased a factory building at 2525 West Pennway and will start production of a plane powered with a Warner Scarab engine at once

Transcontinental Air Transport is employing 75 mechanics at Port Columbus.

Public telephones in special soundproof booths have been installed at strategic points about the observation areas at the Oakland (Calif.) Municipal Airport.

Fourteen graduates of the St Louis-Universal Flying School were placed with aircraft manufacturers and air transport operators recently, it is reported

George R Hutchinson, Baltimore, Md, has taken delivery of a Stinson Wasp for use on a coast-to-coast endurance flight between Logan field, Baltimore, and Los Angeles

Henry J Brown, winner of the Los Angeles-Cleveland non-stop derby of the National Air Races will fly the General Tire & Rubber Company plane, in which he won the race, to the West Coast where he will join the General air fleet now on a 50,000-mi. tour.

Women employees of the Universal Aviation Corporation at Lambert-St Louis Field, are being provided with transportation between the city and the office in a fourteen-passenger bus furnished by the company.

The Horace E. Dodge Boat and Plane Corporation, is to establish a plane manufacturing plant on a recently acquired 100-acre site, formerly occupied by Camp Stuart at Newport News, Va. About $1,000,000 will be spent on grading the water-front, dredging the boat basin and the construction of the first units of the plant. Large scale manufacture of motor boats will be carried on as well as of flying boats and amphibions

A new type of spherical container for transportation of helium gas was tested Sept. 10 in Milwaukee by the A O Smith Corporation, in a series of tests which included continuous hammering by pneumatic hammers while under hydro-static pressure of 1,250 lb, and a simulated train wreck.

An aviation show will be one of the features of the annual Brockton (Mass.) Fair, opening Tuesday, October 2 and closing October 6

August sales of aviation gasoline at Fairfax Airport, Kansas City, totalled 65 000 gal making a daily average only 400 gal less than the total amount sold at the airport during the month of July

Plans for an all-Ohio glider meet are being made by the Akron Glider Club. The club has recently acquired a new sailplane built by Baker-McMillan Company of Akron to the design of Franz Gross

An order for 20 all-metal observation machines has been received from the Air Corps by the Thomas Morse Aircraft Corporation of Ithaca, N. Y., recently acquired by the Consolidated Aircraft Corporation of Buffalo

A new teletype printer is being installed at Moline, (Ill.) Airport for communication between the Weather Bureau office and the radio station located several hundred feet north of the field

AERONAUTICAL CALENDAR

Sept. 21-29	Class C Air Show and International Pilots Reunion, Fairfax Airport, Kansas City, Mo
Sept. 24-26	Second Arkansas Air Tour, sponsored jointly by the Little Rock Chamber of Commerce and Little Rock Chapter, N A A
Sept. 28	Gordon Bennett Balloon Trophy Race, St. Louis, Mo
Oct. 5-21	National Air Tour, Starting from Ford Airport, Dearborn, Mich
Oct. 24-25	Conference on Municipal Airports at Washington, D C, under auspices of the American Road Builders Association.
Nov. 9-17	Western Aircraft Show, Los Angeles.
Nov. 18	Lehigh Airport Design Competition Closes. Lehigh Portland Cement Company
Dec. 10-16	National Aviation Week, Mexico, including air show and air display at Mexico City
1930 February	National Air Show auspices Aeronautical Chamber of Commerce, St. Louis.
Feb. 5-12	New York Aviation Show, auspices Aviators' Post, American Legion
April 5-13	All-American Aircraft Show, Detroit
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce at Madison Square Garden, New York City.
AIRPORT DEDICATIONS	
Sept 20-22	Athol, Mass
Sept 21	Central Airport, Camden, N J
Sept 27-28	[illegible] Municipal Airport, [illegible], N Y
Sept. 28-29	Municipal Airport, Durango, Colo.
Oct. 12	Florence, Ariz.
Oct. 12	Conneaut Airport, Conneaut, Ohio.
AIR MEETS	
Sept. 30-Oct 4	At Louisville, Ky, under auspices of Jefferson Post, American Legion and in conjunction with the national American Legion Convention

New Firms Announced

New Orleans Transport Company Inc, New Orleans, La, capital $250,000 Frank B Smith president, Arthur B Lacour, vice-president, William H. Hoefgen second vice-president, H. J Cole third vice-president, Douglas O Langstaff, secretary and treasurer

Apache Airlines, Inc, Globe, Ariz, capital 50,500 shares no par-value stock, by Harold W Aldrich and Ralph G Vaughn

West Virginia Airways, Inc, Charleston, W. Va.; capital 4,000 shares of no par-value stock, by Frank J Blair Harold B Shadle, Henry G Capito Allen Walters, Jr, L. O Gastineau, Howard G Mays, Anton Pfaff and Chris Hetzel, H A Moore, John T. Morgan, A S Thomas and W D Guyer, to take over and manage the Charleston airport, to engage in air photography, air navigation and operate a flying school

Beaufort Flying Service Beaufort S C, capital $5 000, J E. Horne president and treasurer, S A Showmaker, vice-president, L C Barker, secretary

Service Aircraft Corporation, Kansas City, Mo, capital 20 shares of no par-value stock, Bruce Dodson, Robert W Knowles and Wilson L. Overall; to rent and operate aircraft

Airport Investment Company, Akron, Ohio, capital 250 shares of no par-value stock by R F Hanlin, Murray S Parker and Lola Coda.

Omaha-Bellvue Airport Corporation, Omaha, Neb, capital $500,000, by James E Kintner, president Harry J Rosser, vice-president, and Robert P Hume, secretary to develop a 340-acre airport south of Bellvue and east of the Fort Crook Airport

Boyd Air Craft Corporation, St Louis, Mo, capital $3,000, by C C Boyd, A T Redford and Herbert Browne to engage in a general air transportation business and deal in airplanes and accessories

Plans to Co-ordinate Planes, Cabs, Launches

NEW YORK (N Y) — Co-ordination of planes with taxicabs and motor launches providing a "doorway-to-destination" service all over the country is being planned by the City Transportation Company, with main offices and terminals in New York City The Paramount Cab Corporation part owner of the new transportation firm, will supply 2.000 cabs, and purchase passenger planes for the opening of the first unit in October It has an initial investment of over $1,000,000 at the present time

The service will transport a person or a small group from their address to any part of the country at a cost approximating taxicab mileage rates, making it possible for three persons to travel by taxicab and airplane for as low as $.20 per mile

AIRPORTS AND AIRLINES

Weather Broadcasting Now Almost Continuous

WASHINGTON (D C)—Since the expanded weather reporting service along the transcontinental airway went into operation about July 1, there has been considerable improvement from time to time so that now weather broadcasts are almost continuous Terminal weather reports are broadcast on the even hour and the sector weather reports hourly on the even half hour The service is rendered practically continuous by the fact that much of the information is so extensive that it cannot be given out entirely in the time allowed

Terminal weather reports are broadcast each hour from the following stations and covering the following points on or close to the transcontinental airway

Hadley (New York City) terminal weather for Hadley, Washington, Bellefonte and Cleveland

Bellefonte terminal weather for Bellefonte Hadley Cleveland Cleveland terminal weather for Cleveland, Hadley, Bellefonte, Chicago Maywood (Chicago) terminal weather for Chicago, Cleveland Kansas City St. Louis, La Crosse, Iowa City and Omaha.

Wichita terminal weather for Wichita Kansas City St Louis, Omaha Kansas City Kansas City, terminal weather for Kansas City Wichita St Louis Chicago Omaha St Louis, terminal weather for St. Louis, Wichita, Kansas City, Chicago La Crosse.

La Crosse, terminal weather for La Crosse Chicago Iowa City terminal weather for Iowa City Chicago Omaha Kansas City Omaha terminal weather for Omaha, Kansas City St Louis Chicago Iowa City North Platte Cheyenne North Platte terminal weather for North Platte Omaha, Cheyenne.

Cheyenne, terminal weather for Cheyenne Omaha North Platte Rock Springs, Salt Lake. Rock Springs, terminal weather for Rock Springs Cheyenne Salt Lake. Salt Lake terminal weather for Salt Lake Cheyenne, Rock Springs, Elko Reno Elko terminal weather for Elko Salt Lake, Reno, Reno, terminal weather for Reno Salt Lake Elko, Oakland Oakland (San Francisco) terminal weather for Oakland Reno Fresno Los Angeles Fresno terminal weather for Fresno Oakland Los Angeles. Glendale (Los Angeles) terminal weather for Los Angeles Oakland Fresno

Mail Rate Conference Sept. 30

WASHINGTON (D. C)—Having received data on air mail operations of domestic contractors through the use of the standard accounting sheets supplied by it to the contractors in the Spring the Post Office Department is calling a further conference on the problem of air mail contract adjustments for September 30 here. This will be a continuation of the negotiations started in the Spring looking toward the extension of the present contracts to ten years from the date on which the company began to operate The Post Office Department is said to be ready now to push the readjustment of rates in accordance with its previously announced policy

W.A.E. Studying New Route

ATLANTA (GA.)—Plans for a new transcontinental passenger route are being studied by Western Air Express, it was announced by H G Edgerton traveling passenger representative of the company during a visit here Sept 4-5 The new southern transcontinental route now being surveyed by officials of the company would extend from Los Angeles to New York, via El Paso Dallas Birmingham, Atlanta, Richmond Washington and Philadelphia As stated by Mr Edgerton, the line would be established in units

Western Air Reports Operations and Income

LOS ANGELES (CALIF.) — Records of the Western Air Express show that the company's planes operated at 58 per cent capacity during August of this year as compared with 38 per cent for the preceding month July, on the Los Angeles-Kansas City route Delays of any extent were experienced on only 5 per cent of the trips during this period, with 95 per cent of the trips scheduled being completed on the same day and 90 per cent within 30 min. of the time scheduled Between Los Angeles and San Francisco the company has failed to complete but one trip in the entire fifteen months that the line has been operated

Earnings for the month of August were announced as $98 118 and for the first half of 1929 net earnings were announced as $563 490 as compared with $721 272 for the entire year of 1928 Mail revenues for the first half of the year totalled $1,043 156 61, express $2,673 94, passenger service $127,035 36, excess baggage $85 30, special service $39,425.75, and airplane rental $5 940 85, making a total revenue of $1,218 517 81 Mail revenues jumped from $199 778 for the full year of 1926 to $611 719 for 1927, $1 208 866 for 1928, and $1 043 156 61 for the first half of 1929

Thompson Plans Air Express

CLEVELAND (OHIO)—Air express is to be inaugurated in Michigan by the Thompson Aeronautical Corporation in co-operation with the Railway Express Agency, Inc, it has been announced by Charles A Rheinstrom general traffic manager of the Thompson company The cities directly served include Kalamazoo, Muskegon Grand Rapids Battle Creek, Jackson Lansing Ann Arbor, Detroit, Pontiac Flint Saginaw and Bay City Other Michigan cities will have indirect connections The service is scheduled to start immediately

Varney Opens New Northwest Mail Line

PORTLAND (ORE)—Air mail service over the new route from Seattle, Portland and Spokane to Pasco, connecting directly with Pasco-Salt Lake City service, was started on Sunday, Sept 15 First-flight mail accumulating in Portland amounted to more than 1,000 lb

The operation plan worked out by Leon D Cuddeback, vice-president and chief of operations for the Varney line designates the through Portland Salt Lake City run as the main line with the line from Seattle connecting directly with the Portland terminus and the Spokane line connecting at Pasco

Varney headquarters have been moved to Portland from Boise, Ida. Mechanical operations are housed in Hangar No. 1 at the Port of Portland airport where Christian DeVelschow, chief of mechanics, is in charge. Five mechanics are assigned here ssignment of pilots at present is as follows

Portland—George Buck, Joe Taff Clarence Price and Lionel Kay, to fly the main line to Salt Lake and Kenneth Neese and a pilot yet to be named, for the Seattle run. Pasco—Russell Owen and Arthur Davison, for the Spokane run Salt Lake City—Walter (Doc) Eefsen, J M Barnes, Stanley Compton and George Douglas, to fly the main line to Portland. Main line pilots will make a round trip every three days

No New Equipment Ordered

Charles Wrightson, purchasing agent, will make Portland his headquarters Hal E Nourse Portland director of public relations, and his assistant Ben H Carter, will remain in Portland. Claud V. O'Callaghan, chief of the line's public relations bureau, and Scholer Bangs and Cy Appel of his staff, will continue to make Seattle their headquarters Bob Lund remains in charge of publicity work in Spokane

Varney has not yet ordered additional flying equipment for the contracts The five Whirlwind Stearmans and five Cyclone Stearmans will shoulder the additional burden and mileage However, orders for more planes are expected to be placed soon, according to announcements

Curtiss Flying Makes Report

NEW YORK (N Y)—Curtiss Flying Service, operating from 40 different bases throughout the country, carried a total of 20 017 passenger during the month of August without one fatal accident, according to an announcement by E H Brainerd vice-president in charge of operations

Universal Seeking Reaction of Passengers

ST LOUIS (MO.)— "How do you like our service and what more can we do about it?" is the question asked by Universal Aviation Corporation of its airline patrons. The query is put to the passenger via an air mail business reply card and the various points about which the company is chiefly concerned are typed in with space after each one for an indication of the individual's reaction. Points not covered by the form may be mentioned by the passenger in a larger space provided for general comment.

For instance, the company wants to know how the transportation facilities getting to and from the terminals appeared to the passenger and if the plane arrived and departed on time, according to the passenger's understanding. Then there is the question of how satisfactorily the baggage was handled, and if the employees were courteous, if questions were answered satisfactorily, etc.

This form of barometer for detecting the general reaction of the air traveling public to the service should prove valuable to the operating company if the passengers take the trouble to fill out the simple questionnaire. After filling it out, the passenger needs only to fold it, glue the flap down and mail. Results will be watched with interest.

Arrange Air-Rail Line Through Southwest

TULSA (OKLA.)—Another air-rail arrangement for the Southwest Air Fast Express has been announced. This provides for a Chicago-Los Angeles service via Kansas City, Tulsa, Sweetwater and El Paso. Traveling time between Chicago and California over the new route will be about 44 hr. and the cost of the complete trip $175. The tieup involves the Chicago & Alton Railroad between Chicago and Kansas City. Through ticketing arrangements will be completed with all ticket offices of the railway selling air passage tickets in connection with air travel.

The schedule of the new connection calls for passengers to leave Chicago at 8 p.m. transfering to plane at Kansas City the next morning at 8 a.m. reaching Tulsa at 12:05 p.m., Oklahoma City at 1:55 p.m., Wichita Falls at 3:20 p.m., Sweetwater, Tex., at 5 p.m., traveling overnight by rail from there to El Paso transfering to the Standard Air Lines there and reaching Los Angeles at 4:30 Pacific time, that afternoon.

Canadian Mail Contract Let

OTTAWA (ONT.) — The London (Ont.) Air Transport Company has been awarded the contract for carrying mail between Leamington and Pelee Island for the coming winter, and for the three following years. Service is to be daily, except Sunday, after the close of navigation. The contract is for $192 per week.

Smoke or Dust Haze Bothers Pilots

OMAHA (NEB.)—Flying operations in some of the western states, particularly western Iowa and eastern Nebraska, are being hampered somewhat by hazy atmospheric conditions which cause poor visibility. This is attributed to either smoke from forest fires in the Rocky Mountains or from dust particles which do not settle to the ground on account of the lack of rains. It is a source of considerable irritation to pilots.

Continental Moves to Cleveland

CLEVELAND (OHIO)—Offices of the Continental Air Lines, Inc., operator of the Cleveland-Louisville, air mail and passenger line, have been moved here from Cincinnati. Herb Kindred, operations manager of the line has established headquarters at the new Universal Air Lines hangar at Cleveland Airport. H. E. Barber, in charge of the Continental division of Universal Aviation Corporation, also is making his headquarters here.

P.A.A. Opens Guiana Mail Line

NEW YORK (N. Y.)—The new air mail service between Miami and Dutch Guiana, to be operated by Pan American Airways, was to be opened by Colonel Lindbergh, technical advisor of the company, Sept. 20. His schedule is as follows: Sept. 20 leave Miami using a Fokker F-10; Sept. 21, arrive at San Juan, Porto Rico, spending the previous night at Santiago, Cuba; Sept. 22, leave San Juan; Sept. 23, arrive Paramaribo, Dutch Guiana, spending the previous night at Port of Spain, Trinidad. A rigid flying schedule will not be maintained for the balance of the trip, the party returning to Trinidad and then going westward through Maracay, Venezuela, Curacao, Dutch West Indies, to Cristobal, Canal Zone. Colonel Lindbergh will return to Miami about Oct. 4.

Latin-American to Operate Daily

SAN FRANCISCO (CALIF.)—Daily passenger service over the newly inaugurated Pickwick air route from this city, to Guatemala City, Guatemada, via Los Angeles, San Diego, and Mexico City, will be started Oct. 15, according to the announcement of M. J. Kelson, foreign traffic manager. Pickwick's Latin-American Airways is now providing tri-weekly passenger service between Los Angeles and Guatemala City on a 48-hr. schedule.

Highway Air-Making System Recommended

WASHINGTON (D. C.)—A suggested method of marking highways for the benefit of pilots, has been drawn up by the Aeronautics Branch. Full details on the recommended system to be employed will be released later, but in general, the scheme is to employ characters from 10 to 30 ft. high painted in chrome yellow, or white traffic paint, against a black background, or outlined in black, in the case of light pavements.

The marking consists simply of the airway route's number, preceded by U. S., in case of a Federal Highway, or the abbreviation of the state in the case of a state highway. These markings, says the report, should read from west to east and from north to sooth, depending on the general direction of the highway, and should be placed at all intersections with other highways and at intervals of not more than 20, and preferably 10 mi. along the routes.

The use of the highways in this manner is expected to provide a very helpful form of air marking, which is, of course, one of the simplest and most effective methods of aiding the important function of air navigation. The bulletin describing further details of this plan is to be released soon.

Half-fare Offered By Western Air Express

LOS ANGELES (CALIF.) — After careful consideration of all factors involved, Western Air Express has decided to carry children between the ages of two and twelve for half fare. In making this announcement, C. W. H. Smith, general traffic manager, explained that the company had come to this decision despite the fact that in many cases children occupy a space which could otherwise be used by an adult passenger paying the full price.

The rate will be available on all lines of Western Air Express, which are: Los Angeles-Kansas City; Los Angeles-Agua Caliente, Mexico; Salt Lake City-Los Angeles; Los Angeles-San Francisco; Cheyenne, Wyo., and Pueblo, Colo.; and Los Angeles-Avalon, Catalina Island.

Yellow Cab Changes Schedule

MINNEAPOLIS (MINN.)—A new operating schedule, under which Rochester, Minn., and St. Joseph, Mo., are regular stops, has been announced by Yellow Cab Airways, Inc., operating airplane passenger service from the Twin Cities to Kansas City via Des Moines. Under the new schedule the plane leaves Minneapolis on Tuesdays, Thursdays and Saturdays at 9 a.m., stopping successively at Rochester, Mason City, Iowa, Des Moines, St. Joseph and Kansas City, arriving at 2 p.m., 30 min. later than the former time. The northbound trip is made on Mondays, Wednesdays and Fridays on the same schedule.

Continental to Open Lakes-Gulf Service

CHICAGO (ILL.)—An airline connecting Chicago, Memphis and New Orleans is to be put in operation soon by Continental Air Services, Inc., 120 South La Salle St., Chicago, according to an announcement by Maj. M. D. Mann, president of the company. A fleet of Travel Air cabin planes will be used on the route between Chicago and Memphis, while Keystone-Loening amphibions will be used on the Memphis-New Orleans section where the route lies chiefly over water. Each section will require about 4½ hr. of flying, and the schedules are said to be arranged so that a person may cover either section by train and complete the other by plane.

The other officers are: C. A. McElvain, vice president; J. K. Fogle, vice-president and treasurer; Alma Zimmerman, secretary. Directors are Major Mann, chairman of the board; Walter Beach, president of the Travel Air company; Col. L. V. Regan, of Lawrence Regan & Company; Alfred Anderson of Grigsby, Grunow & Company; Albert Pick, Jr.; W. L. Holst of Grigsby, Grunow & Company; and J. K. Fogle of W. G. Gates & Company.

Arrange For Officials Of U. S. to Use Airlines

WASHINGTON (D. C.)—Government officials, travelling on departmental business, may take advantage of the offer made by some of the air transport lines of rates the same as rail fares, according to unofficial expressions from the General Accounting office. These rates are being extended to those travelling on official business as a means of drawing public attention to the regularity and magnitude of the air line service.

When the exigencies of Governmental procedure require particular speed in transportation, routing may be made via the airways despite the additional cost, according to an opinion already rendered by the Comptroller General. It is believed that by becoming used to air travel on the lines that have put the reduced rates into effect, the various department officials will be more prone to resort to the general use of air carriers when time is a factor, according to the announcement.

T.A.T. Using Two Condors

COLUMBUS (OHIO)—Two Curtiss Condor 18-passenger transports went into service on the Columbus-Waynoka section of the Transcontinental Air Transport Line, augmenting the fleet of Ford transports, when service was resumed Sept. 16 after temporary suspension on account of the recent wreck of the City of San Francisco. Operation of these machines will be largely in the nature of an experiment for the present, of course, and their performance will be closely watched throughout the industry. [Description of the Condor appeared on page 234 of the issue of July 27.—Ed.]

Resume Seattle-Victoria Service

SEATTLE (WASH.)—Airplane passenger service between this city and Victoria, B. C., recently was resumed when a 6-passenger seaplane, operated by the Alaska-Washington Airways Company, took off from the company's base on Lake Union. This service was discontinued a year ago when a large passenger plane crashed into the water near Port Townsend. Regular service now is being maintained, the flying time on this schedule being 45 min.

Air Mail Record Set During August

WASHINGTON (D. C.)—For the fourth consecutive month the air mail poundage has increased by a wide margin over preceding months. The August volume of air mail carried by the domestic contractors is reported by the Post Office Department to have reached 698,062 lb., a new record. This is an increase of 59,252 lb. over July. The daily average jumped 2,662 lb. from the July average of 20,606 lb. to the August average of 23,268 lb.

The poundage figures are as follows:

Routes		June	July	August
Boston-N. Y.	192	11,249	11,954	13,122
Chicago-St. L.	278	7,480	7,611	8,219
Chicago-Dallas	1,059	31,371	36,882	41,690
Salt L.-Los Ang.	600	60,720	65,669	69,505
Salt Lake-Pasco	550	17,751	18,146	20,344
Seattle-Los Ang.	1,141	22,178	23,878	23,224
Chicago-Minne.	503	11,977	20,134	26,931
Cleveland-Pitts	125	3,891	5,687	6,771
Chey.-Pueblo	199	8,932	9,475	10,481
Cleve.-L'ville	345	10,581	10,622	11,883
N. Y.-Chicago	718	141,104	154,178	163,534
Chicago-San F.	1,952	148,487	157,502	169,285
N. Y.-Atlanta	763	30,840	32,817	35,832
Albany-Cleve.	446	8,178	8,641	9,814
Dallas-Galv.	320	4,891	3,541	3,673
Dallas-Browns.	529	6,203	8,823	7,490
Atlanta-New O.	483	9,698	7,750	8,507
Chicago-Cin.	270	4,342	6,920	8,510
Atlanta-Miami	736	6,271	8,624	9,795
Gr. Falls-Salt L.	489	7,303	7,297	7,529
Chi.-Bay City	712	17,342	18,866	23,950
St. L.-Omaha	403	4,198	5,210	5,621
New O.-Houston	319	5,394	5,740	4,200
Chi.-Atlanta	768	8,254	8,226	9,117
Total	13,858	593,254	638,810	698,062

Increase August over July—59,252 lb.
Daily average, July, 20,606 lb.; August, 23,268

Flower Shipments By Air Increasing

WASHINGTON (D. C.)—The White House evidently has seen the desirability of employing air mail for the shipment of flowers. A spray of magnolia leaves and orchids was sent by air recently from the White House gardens to California.

Florists are awakening to the possibilities of the use of airways for the transportation of flowers, in the opinion of William F. Gude, Washington representative of the Society of American Florists and Ornamental Horticulturists. In the future long distance calls for rare flowers frequently will be shipped by air.

Air mail has been used for the shipment of exhibits to the great National Flower Show at San Leandro, California, from the East. Dahlias sent from Washington, on the evening of Sept. 12 were expected to reach Oakland, the morning of Sept. 14, the opening day of the show.

Arrowhead Launches Duluth-Port Arthur Line

DULUTH (MINN.)—The Arrowhead International Airways operated by the Schlee-Brock Aircraft Corporation of Detroit, Mich., inaugurated an 190 mi. airline on Sept. 11 between Duluth, Minn., and Port Arthur, Canada, with the former city as the base of operations. Lieut. J. M. Gillespie and J. Warren Smith, manager of operations will be the pilots on the Lockheed Vegas (equipped with Edo pontoons in the summer and skis in the winter) making three round trips weekly (Monday, Wednesday and Friday) for a month or two, after which daily flights will be made. The planes land in the Duluth harbor within five minutes of the business district.

The line will be extended to the Twin Cities as soon as the Duluth Municipal Airport is available for year round operations. In addition, planes will be available for special flights to the numerous lakes in the Superior National Forest for the many fishing and hunting parties visiting this region, as a part of the service offered by the Arrowhead International Airways. The planes leave Duluth at 9 a. m. Central time, and Port Arthur at 4 p. m., Eastern time. The fare is $30 one way and $55 round trip.

Build Aviation Country Club Plant in Cleveland

CLEVELAND (OHIO)—Walnut Crest Country Club, organized two years ago, has finished an airplane landing field adjoining its golf course 40 mi. east of the city, being the first aviation country club in this city. The field has been dedicated Wolcott Field in honor of N. A. Wolcott, president of the Packard Electric Company of Warren, Ohio.

The field has a runway 2,500 ft. long and eventually will be surrounded by five 18-hole golf courses, according to A. W. Green, manager and founder of the club. Green believes golfers of the future will make use of the field in flying to and from the city and believes that Walnut Crest is the first club in the country to make arrangements for flying golfers.

Colonial Lake Service Busy

NEW YORK (N.Y.)—Passenger Service on the Buffalo-Toronto airline, inaugurated July 1 by the Colonial Airways System, carried 131 passengers the first month and 327 during August, an increase of over 150 per cent during the second month of service. It is expected that this service, using Sikorsky amphibions, will be temporarily discontinued during the winter months when ice forms on Lake Erie. The New York-Albany-Montreal air mail and passenger service, operated by Canadian Colonial established a perfect operation record during the months of July and August, carrying 145 passengers during the latter period.

AIRPORT CONSTRUCTION PROJECTS

Leonard Macomber, Inc, airport engineers and builders has been retained to construct the Muncie (Ind.) Municipal Airport, recently presented to the city by Abbott L. Johnson, president of the Muncie Airport Commission. The first 160-acre tract is expected to be ready for flying operations in the early spring. The company has been retained also to make preliminary surveys for airport projects for Sioux City, Ia., Iowa City, Ia., Sioux Falls, S. D., Rock Island, Ill., and Dubuque, Ia.

Davenport (Ia.) Airways, Inc has let a $24 000 contract for a 60x100 ft. reinforced steel and concrete hangar and a lighting system for Cram Field. A 40x100 ft. concrete apron will be build in front of the hangar. A federal intermediate field is being developed on the Elmo Johnson ranch, midway between San Antonio and El Paso.

Burlington (Ia.) City Council and Chamber of Commerce have a committee planning and designing work to be done on the airport formerly held by the Burlington Airplane Corporation as soon as the approval of the state railroad commission has been secured for transfer of the lease from the airplane company to the city. At present the field includes 55 acres with tiled drainage and two landing strips, 2,100x500 ft. Work is said to be progressing rapidly on the United Airport being built at Burbank, Calif., by the Boeing System.

Stout Development Miami Terminal

Stout-D.&C. Air Lines are reported to be spending $25,000 for additional seaplane facilities at the Miami (Fla.) Municipal Seaplane Base in anticipation of the inauguration of an air transport service, full details of which have not been announced.

It is expected the construction of a new 300-acre airport near Harrisburg, Pa., will be completed by Armistice Day. It will be operated by Pittsburgh Aviation Industries Corporation. The field is owned by the Capital Landing Field Company created by the Harrisburg Chamber of Commerce and financed by prominent citizens. Complete flood-lighting equipment has been bought for the Rockford (Ill.) Airport, by the Rockford Chamber of Commerce. A steel eight-plane hangar has been completed and six of the eight compartments have been rented.

Thompson Aeronautical Corporation, of Cleveland and Detroit, has announced plans for the construction of a $100 000 office building, hangar and shops at the Pontiac (Mich.) Municipal Airport. This will become the district headquarters for the company and will be built on a site leased for ten years. Construction will start Oct. 1 on the two-story brick and stone office building 40x120 ft. This will house plane display rooms and business offices on the ground floor and class rooms for the flying school on the second floor. There will be also a brick, steel and glass hangar 120 ft square, and an adjoining building which will house the heating plant dope room and welding shop. The buildings have been designed by the Roberts Wright Company, of Cleveland.

The construction of an emergency landing field south of Sutherland, Neb., is about completed by the government. The emergency field at Paxton will be abandoned when the Sutherland field is commissioned. Wire fences have been installed at the North Platte (Neb.) Municipal Airport to control automobiles and spectators.

Enlarge Lunken Airport

Lunken Airport, Cincinnati, is being enlarged by 175 acres, making the total operating space on the western side of the field 450 acres. Grading and filling is being carried on by Hickey Brothers Company, of Columbus, and since work started on Sept. 9, about 250,000 cu yd. of earth have been filled. A network of 18-in drains is being installed in the field also, and an automatic pump will lift water over the dike into the Little Miami River. On account of the enlarged area, it will be possible to extend the 3 200 ft. east-west runway to about 4 800 ft. and the north-south runway to about 2,500 ft. from 1,200 ft.

A force of 80 men are starting work on the new 170-acre Ocala (Fla.) Airport under the supervision of J. E. Walker, county engineer. Betts Field, Pittsburgh, has been bought from the Aircraft and Airways of America company by the Curtiss Airports Corporation and will be improved according to plans developed by Kenneth Franzheim, architect, of New York. Grading of the field which involves the removal of 425 000 cu yd. of earth, has been started. A drainage system is to be installed, hard surface runways and concrete apron will be built. The present buildings will be razed and two large hangars and a central terminal building will be constructed at once. The Franklin Airport Corporation has been organized at Turners Falls, Mass., to develop an airport in that city.

Construction is reported to be well under way on the new concrete and steel combined hangar and tank station for Pitcairn Aviation at Candler Field, Atlanta, Ga. The building is of Spanish modernistic architecture, will measure 120x140 ft. and will cost about $52 000. It is expected to be ready for occupation by Nov. 18. An airport is to be built at High Point, N. C.

Detroit Buys Land

The Detroit (Mich.) City Council has approved the purchase of about 18 acres of land adjoining the municipal airport at a cost of $307 653. Still another addition to the tract is being sought through negotiations with officials of the Gethsemane Cemetery for the purchase of 35 acres.

Plans have been announced for a great Philadelphia air base on Hog Island with train and steamship facilities, as well as accommodations for planes, seaplanes and dirigibles. In a report by R. Harlan Hopton the executive director of the Philadelphia Business Progress Committee. The site is 25 min. from the center of the city and consists of 925 acres which are controlled by the U. S. Shipping Board. It is recommended that a quasi-public corporation to be known as The Philadelphia Terminal of which the city would be the owner, be formed to operate the project.

About 150 acres of the new Curtiss-Steinberg Airport south of East St. Louis, Mo., are available for flying operations now and the first hangar is under construction. When completed, the field will comprise 510 acres with runways, surfaced roads, lighting equipment, meteorological station administration building, passenger depot and various hangars and school buildings.

Omaha Firm to Develop Tract

Development of a 340-acre tract east of Fort Crook (Neb.) Airport is planned by the Omaha-Bellvue Airport Corporation. Plans include a runway 1 mi. long, another 3,700 ft. long and a third 3,450 ft. long, and four others about 2,500 ft. long. All will be 750 ft. wide. An 80-acre tract just south of Paris, Ill., has been bought for development as an airport. Work was started at once on preparing the field and constructing hangars.

The board of county commissioners has voted $15,000 to be used by Ely, Minn., in the purchase of an airport site. This is Ely's share of the $50 000 set aside in the county budget for airport development. The Topeka Airport & Navigation Company, 1345 Fillmore St., Topeka, Kan., has awarded the contract for construction of 100x120 ft. hangar to the Topeka Foundry & Iron Works.

The Mankato (Minn.) Chamber of Commerce has let the contract for the construction of a hangar 60x80 ft., at the Mankato Municipal Airport. The Wilmington (N. C.) County Aviation Commission has been authorized to proceed with plans for hangars at the Bluementhal Airport with Louis L. Merritt in charge of designing and construction. The Columbus (Ohio) City Council passed an ordinance to appropriate $1 110 for the supplementary contract with B. F. Patterson to remove 111 trees from the site of Port Columbus Airport.

Halt Air Mail Pickup Tests

YOUNGSTOWN (OHIO)—Operation of the Adams air mail pickup device at Lansdowne Municipal Airport has been halted temporarily and mail planes on the Cleveland-Youngstown-Pittsburgh line are making their regular daily stops here. Dr. Lytle S. Adams, inventor of the device is making several minor changes in the apparatus. The pickup has worked satisfactorily on a number of occasions. Other times however the cable broke close to the ground and the portion remaining attached to the plane whipped back damaging the ships. Dr. Adams announces the device will again be operated as soon as the changes are made.

FOREIGN ACTIVITIES

French Firm Gets South American Rights

SANTIAGO (CHILE) — Exclusive rights to transport at least half of the air mail originating in this country and destined for Bolivia, Peru, United States and intermediate countries over a period of five years has been granted to the Compagnie Generale Aeropostale of France. This is considered an important concession in view of the rivalry between companies of various nationalities seeking to secure air mail routes and privileges in South America. Among these are Pan American Airways, the New York, Rio and Buenos Aires Air Line and the American International Airways groups.

The French company also has a contract with Venezuela to carry all Venezuelan air freight being sent to Europe, Africa and other South American states. Securing these agreements is credited to the French Air Mission which has been making an extensive tour of South America for the purpose of encouraging French aeronautical enterprises. Agreements also are reported from Paris as having been made with Italian and Spanish governments. These arrangements mean all Spanish and Italian air mails destined for France, Morocco, Western Africa and South America will be carried by the French company's planes.

Balbo Italian Air Minister

ROME (ITALY)—Gen. Italo Balbo, for a number of years Under-Secretary of Aeronautics in the Italian government has just succeeded to the post of Air Minister. The position was relinquished by Signor Mussolini, along with several others that he held, as a part of his recent reorganization of his government. General Balbo, who has retained his active military rank in spite of his political post, qualified as a pilot several years ago and has kept up his flying. He headed the Italian delegation to the International Civil Aeronautics Conference in Washington last December, and subsequently made an extensive tour of the centers of American aeronautical activity. He has been a leader in the Fascist group since Fascism came to power, and is among the most influential of Mussolini's followers.

Build New Engine in Australia

SYDNEY (AUSTRALIA)—The first airplane engine to be designed and built in Australia has been completed and recently made a satisfactory run on the bench. It is known as the Harkness "Hornet," being of the light four in-line air cooled type with overhead camshaft.

Panama Has Aviation Board

PANAMA CITY (PANAMA)—A National Aviation Board of six members has been created to encourage and supervise the aeronautical development in this country. One of the projects now under way is the construction of a commercial airport by the Federal Government 3 mi. from the center of this city. When completed it will have three landing strips 3 000 ft. long and 500 ft. wide.

State Requirements Of French Air School

PARIS (FRANCE)—The French Air Ministry has announced that the "Ecole Nationale Superieure de l'Aeronautique," a governmental school, will open its session in November 1930. Foreign students will be admitted under the following conditions. Foreigners not employed by their government will have to take an examination for admission in Paris, in June 1930. The program for this examination will be the same as the one for the admission to the Ecole Polytechnique in Paris.

Those passing this examination will be admitted to a preliminary course of studies of one year after which they will be admitted to the regular two year course. Foreigners in the employ of their government will be admitted directly to the two year course without the preliminary year of studies, upon official demand by their government. However it should be well established that they are qualified for the work.

Australian Aerial Medical Work Success

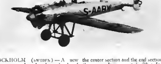
SYDNEY (AUSTRALIA)—The year for which he offered his services having expired, Dr. K. St. Vincent Welsh, the "flying doctor" appointed by the Australian Inland Mission of the Presbyterian Church, recently returned to Sydney where he practices. Dr. J. A. Spalding, will carry on the work.

The establishment by the mission a little more than a year ago of an aerial medical service to give settlers in Central Australia, the Northern Territory and the interior of Queensland the medical assistance which poor roads and unbridged water-courses had hitherto made impossible was undertaken largely as an experiment. Recently the mission officers expressed themselves more than satisfied with the results.

In a report furnished by Dr. Welsh it is stated that the ambulance plane traveled more than 20 000 mi. and was several times instrumental in saving life. Dr. Welsh attended patients, treating the sufferers himself when possible, and at other times conveying them by plane to the nearest district hospital. With Cloncurry, Queensland as a base the ambulance plane can cover roughly, an area of 300,000 sq. mi. but in urgent cases can proceed outside the area.

The mission hopes eventually to establish bases for flying doctors at Broken Hill in New South Wales, Marree in South Australia, Alice Springs in Central Australia, Katherine in the Northern Territory.

Develop New Pursuit Plane in Sweden



STOCKHOLM (SWEDEN) — A new army pursuit plane has been developed in Sweden. This is a two place monoplane, the rear cockpit having a machine gun mounting above the fuselage. Excellent visibility for both cockpits is claimed for the design.

Construction is duralumin for the most part with some sections of steel. The wing is composed of three parts, the center section and the end sections of the wing. It is powered with a Jupiter VII engine of 420 hp.

The machine is about 26 ft. long and has a span of about 39 ft. The total weight loaded is 3 597 lbs. Its maximum speed is about 150 m.p.h. and landing speed about 65 m.p.h. Its ceiling is 24 912 ft. One of the unusual features of the design are the rudders.

WHAT OUR *Readers Say*

Parachute Stunts

To the Editor

Your editorial on "Fool Stunts," in the issue of July 13, touches a subject in which the Irving Air-Chute Company is vitally interested.

It is undoubtedly true that during the early stages of experimental work it was necessary for someone to demonstrate the fact that it is possible to drop, say one thousand or more feet, from an airplane and still retain your senses and operate a parachute if the necessity arose This was done several times, as you perhaps know, by Army and Navy fliers

It is thought, however, by the Irving Air-Chute Company that every effort should now be made to stop such fool-hardy stunts as seeing how far one can actually drop just to create a record There have already been several lives lost, and the Irving Air-Chute Company is absolutely opposed to this type of stunting The writer personally took it up with the Government officials when this was being done by the Army and Navy some time ago, and if I am correctly informed both the Army and Navy have a ruling that there should be no more delayed drops made of this kind

It is the intention of the writer to take this matter up with the Department of Commerce to see if they will make a ruling to prevent this type of jumping

George Waite,
President,
Irving Air-Chute Company, Inc,
Buffalo, New York

* * *

Light Plane Requirements

To the Editor

Understanding that the pages of your magazine have been thrown open to correspondence from subscribers, may I not avail myself of this opportunity to express an opinion which I hope may stimulate some discussion among those interested in the manufacture and sale of small airplanes for individual use.

In the eyes of one who likes to think of himself as a professional layman, it seems obvious that the mistake of placing too much emphasis on per formance is still being made. Apparently the manufacturers of small planes are so close to their market that they have failed to estimate the requirements of this market in their proper proportions.

Safety is still by far the most important consideration in the use of airplanes by individuals The number of such who would fly if it were safe, either as owners of planes or passengers, is just about equal to the population of the country The number of those who can afford to fly must be very considerable, else what accounts for the sale of Rolls Royces, Packards Cadillacs and Pierce Arrows? Speed or performance in the air is of negligible importance to the vast majority of individuals Stability in the air and the ability to take off from a comparatively small field, or to land in one in case of emergency at a slow speed and at a steep angle of descent, is of tremendous importance

There are no traffic hold-ups in the air and the man who can take off near home and land near his destination consumes less traveling time than one who flies in a machine of brilliant performance which has to take off and land some distance from his starting point and destination

Furthermore, if flying were safe as motoring, the public would far rather fly in airplanes of low speed on Sundays than drive in a line of vehicles on a crowded highway

I believe the Guggenheim Foundation has a better understanding of the market for light airplanes than the industry itself and I should be interested in an explanation as to why more plane manufacturers are not competing in the safety tests now being conducted Why is not research concentrated on the reduction of landing speeds and the use of slotted wings or their equivalents?

T J Duncan Fuller, Jr
[Airstocks, Inc]

Editorial Comment FROM THE DAILY PRESS

Airplanes That Swim

The vision of the sixteenth century voyager, who in fancy saw a galleon rise out of the sea to a tremendous height, and then sail through the air to fabled isles of wealth, is finding a modified fulfillment as the flying boat, with the giant Dornier air liner as its most challenging exponent, is increasingly utilized.

When it is remembered that three fourths of the earth's surface is covered by oceans and seas and that many centers of activity on the continental areas are located along rivers and lakes, the plane that can swim as well as fly looms as a versatile factor in the air future.

John Cabot's cockleshell barks opened the way for the Bremen in making the Atlantic a connecting link between northern Europe and America, rather than a divider of the continents. Advancing beyond the ocean-going vessel, the airplane has risen into the rarer element, where speed is increased four times Now the flying boat promises to give the seas a new role, that of a landing field, present all along the air course

Rivers also assume a new significance as clearly marked lanes for air traffic Free of high obstructions above the water level, they offer at the same time clear air highways, and landing fields on which flying boats may come to rest in the heart of cities like New York, New Orleans and St Louis When New York is projecting expensive landing fields on the tops of buildings, in order to bring planes closer to the city's center than is possible with the present airports, all distant more than an hour's drive, the value of a flying ship that can land at many points in the Hudson or East River is obvious

Airplanes that depend upon earth landing fields become, under present circumstances, unprofitable as carriers beyond a certain increase in size, aviation engineers have pointed out, since the necessity for rapid climbing to clear obstructions around their landing areas causes the structural weights to increase in greater ratio than the carrying capacity Flying boats with practically unlimited room to take off and land, can be increased in size to a greater degree, due to their more gradual climbing gradient.

Exploration of wilderness regions becomes simpler through the flying boat, which can land on mountain lakes that could not be reached otherwise without extensive pioneering Landing fields await the flying boat wherever a sheet of water gleams and the amphibian, equipped with wheels, can also utilize any area available for ordinary landings Airplanes that swim open possibilities which wait only for attention to the details, such as discovery of light metals which will stand up under contact with salt water, for a fuller realization Christian Science Monitor

THE BUYER'S LOG BOOK

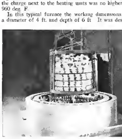
G. E. Heat Treating Furnace

ANNOUNCEMENT has been made by the General Electric Co, Schenectady, N Y., of the development of a new type of electric furnace especially designed to heat treat aluminum alloys

The new furnace is a pit type, cylindrical unit having two circuits One, rated 220 volts, 3 phase with a Y-series connection, is in the top, while the other, in the lower side walls and bottom, is rated 220 volts, 3 phase with a Y-delta connection At high heat the power consumption is 84 kw and at low heat 28 kw

In a typical application of this furnace a run of castings weighing approximately 500 lb plus a basket weight of 700 lb, both at room temperature, was placed in the furnace at a temperature of 960 deg F In $1\frac{1}{2}$ hr the center of the charge was at the heat treating temperature, although for a third of this time the furnace was operating on low heat A check showed that the outside of the charge next to the heating units was no higher than 960 deg F

In this typical furnace the working dimensions were a diameter of 4 ft. and depth of 6 ft It was designed to heat a charge weighing 1,500 lb plus a basket weight of 500 lb from 600 to 950 deg F in one hour, and to hold the charge at the latter temperature for 12 hr The estimated radiation at the holding temperature is 17 kilowatt-hours per hour



A charge being lowered into the General Electric pit furnace

Oleo-Pneumatic Tail Wheel Unit

THE Cleveland Pneumatic Tool Co, manufacturers of Aerol Oleo-Pneumatic landing struts, have announced the development of a tail-wheel oleo-pneumatic unit This offers manufacturers three-point suspension on this type of shock absorber which has been used extensively for landing gears

Frisbie Pitch Indicator

A NEW TYPE of pitch indicator has been placed on the market by Frisbie Aircraft Products, New Haven, Conn The principle of operation of this instrument is that of a pendulum geared with a ratio of four-to-one to a rotating drum The instrument is mounted in a spun aluminum case with a screw-on chromium-plated bezel Mounting screws also are chromium plated

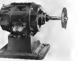
The Frisbie Pitch Indicator

Accurately fitted cup and pivot bearings of steel are used to mount the two moving parts and require no lubrication. Damping liquid is used to overcome vibration effect and provide a steady reading under all conditions The scale is easily readable and an adjustment is provided to compensate for inclination of the instrument board

The diameter of the case is $2\frac{9}{16}$ in, the diameter of the flange, $3\frac{1}{2}$ in and the depth of the case 3 in The weight of the instrument is 8 oz It is available with either plain or luminous dial

Blount Tap Grinder

DEVELOPMENT of a new machine for tap grinding has been announced by the J G Blount Company, Everett, Mass This machine driven by a specially designed $1\frac{1}{4}$ hp Westinghouse type SK motor is applied to the grinding of tap flutes by the use of a taper arbor on the end of a spindle, using various sizes of grinding wheels. For the grinding of small taps, wheels of small diameter and width are used, while, on larger taps, grinding wheels up to six inches in diameter and $\frac{1}{2}$ in to $\frac{3}{4}$ in wide are employed.



Blount Tap Grinding Machine

These grinders are self-contained being driven by a special direct connected, totally inclosed, ball bearing motor with a speed range of 4,000 to 7,000 r p m The motor is controlled by a field rheostat so that any grinding speed may be obtained up to 7,000 r p m A smooth finish can be obtained by the inherently close speed regulation of the drive

SIDE SLIPS

By
Robert R. Osborn

MR J D. of Buffalo N Y, wandered into the office just now with the prize newspaper clipping of the week It was from a small Virginia paper and concerned the recent flight of bombers from there to the West "Nine Keystone Panthers are crouching on the line at Langley Field ready to take off at a month's notice "

• • •

R. H D Jr reports a new flying thrill which is now available to the civilian flier He had been high-hatted for years by Army and Navy pilots who had a habit of looking him over with a condescending air as they whizzed by in their high-powered ships Recently he was ferrying a cabin plane with plenty of power in it out West and had the extreme pleasure of tipping his straw hat to the helmeted and begoggled boys in an Army two-seater

• • •

With all of this merging and combining going on in the business we knew there would be a revolt of some sort before long According to the headline on an item from the Baltimore *Sun* sent in by W K E of Baltimore, Md the worm has turned at last "Stearman Aircraft Group Buys United Corporation." Here's a company which not only refused to be taken over by a large holding group, but up and buys the holding corporation

• • •

Mr C. F McR of Los Angeles Calif, quotes from an editorial in a local paper, The great Dornier Do-X carries 12 powerful engines and will make unnecessary forced landings under any but most extraordinary conditions "

We agree with Mr McR that necessary forced landings come often enough without complicating matters with unnecessary ones

• • •

Mr McR also points out the possibility of aviation engines in the near future with inferiority complexes, according to a Los Angeles news item, "The ——— engine is being turned out on a schedule calling for ten complexed engines each day "

• • •

THE WEEK'S ASTOUNDING AERONAUTICAL EVENT

Found in the Laramie *Republican and Boomerang* of Laramie Wyo by F W W of Raton N M — The pilot before landing climbed several thousand feet in altitude and circled around two or three times and then taxied down '

• • •

An interesting insight on refueling endurance flying is found in an item sent in by J W W

"According to Maj William B Robertson of the Curtiss-Robertson Company sponsoring the flight body troubles have not bothered the fliers although the 'Angeleno' and the 'City of Cleveland' were forced down by such causes He attributed this to the use of welded metal tubing"

Possibly listerine would be good for this too

• • •

Apparently the old tradition that an air race is always a big loss for the city in which it is held is still hanging on to our modern Ford tour according to the item from the Saint John N B *Telegraph Journal*, contributed by Mr, F N D 'Early in October several Canadian cities are to have the opportunity of seeing the annual Ford Liability Tour "

• • •

In connection with the cross-country races to the Cleveland show a number of investigations have been made of forced landings caused by 'foreign matter' in the gasoline tanks of several ships It is our opinion that all foreign matters should be referred to the State Department and we are sure that a careful reading of the Kellogg Treaty will reveal some provision therein for preventing such forced landings in the future

• • •

We see by the papers that one of the trans-continental air lines has installed radio equipment in its ships which will enable pilots to talk to the fields en route, and is considering carrying a telephone operator and a switchboard so that passengers can be connected to any ground telephones or other ships Here we have the first real possibility of a use for these refueling endurance flights Four hundred hours would be about the right length of time for the passenger to get his correct number

• • •

There is another possibility to this airplane telephone business which appeals to us very much Whenever we get into a traffic jam in the Antique Coupe we can't think of anything adequate to call the truck driver until we are miles away In the future there will be aerial traffic jams, of course, and with the radio telephone one will be able to call up the driver of the piano-moving airplane from a good safe distance away and call him whatever the apparatus can stand.

• • •

Another prize item came in from W F D of Rutland, Vt, being the description of an accident resulting from a landing on rough ground, as reported in the local paper "It was apparent that the only safe landing that could be made under such poor conditions was a flap jack"

• • •

A news item states that two residents living near an eastern flying field have complained to the District Attorney that the field is a nuisance —" said that the propellers kicked up so much dust that they were obliged to close their windows He said that the condition has been a nuisance for more than a year but that despite all of their efforts there had been little improvement" Our own opinion is that the residents didn't half try They should close their doors too, and if that doesn't keep the dust down on the field, they would have a right to complain

• • •

The Intrepid Aviator came in a short time ago to trade some conversation for a refueling of cigars and matches and mentioned that a new airplane was christened the other evening at one of the New Jersey airports and all attending pilots were required to 'dress correctly," which apparently meant top hats and evening dress He said he was planning to unveil a new landing gear on his Jenny very shortly and all persons who could obtain invitations to the event would also be required to dress correctly—discarded Army breeches lumberjack shirt and a sailor hat

AVIATION

The Oldest American Aeronautical Magazine

September 21, 1929

AERONAUTICAL ENGINEERING SECTION

CONTENTS

AN APPROXIMATE EXPRESSION FOR

Airfoil Profile Drag

A Communication from

COL. V. E. CLARK

IN AN article "Design Your Own Airfoils," by the writer, published in the October 25, 1927, issue of AVIATION, data was furnished to enable the engineer to design an airfoil to meet the particular phases of his problem by giving proper spar depth, maximum lift and minimum drag for the régime of lift coefficient in which he was particularly interested. Recent wind tunnel tests on a model of an airfoil designed exactly according to the instructions given in this paper show quite interesting results. The model was quite roughly made and it is probable that a smooth model would have shown more favorable results.

The tests were made at an air speed of 40 m.p.h. and a density of one atmosphere. The aspect ratio was 7.8 and the mean thickness ratio was eleven. The camber of median lines was constant across the spread with a maximum displacement from base line of .036 instead of .04. In other words referring to Table I all ordinates of median lines were multiplied by the constant factor .9. Thickness ordinates were multiplied in the mean by the factor 1.1.

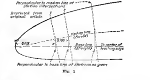


Fig. 1

At a lift coefficient of .001 (lb., sq.ft., m.p.h.) the L/D was 26.0. The maximum lift coefficient was .0033 and the center of pressure movement was extraordinarily good. Judging from these results the qualities of this airfoil are sufficiently better than those of the "Y" to make it interesting. A number of check runs were made in the wind tunnel to be sure that there were no errors.

I have found that in making a study to determine the optimum proportions of a wing for a specific design problem it would be invaluable to have a simplified approximate expression for airfoil profile drag. There is a given combination of wing loading, aspect ratio, the airfoil thickness ratio at the root of the cantilever which is best for any specific purpose. For example the increase in profile drag with increase in the airfoil thickness ratio should be weighed against the reduction in weight of wing spar chord members. An approximate expression for airfoil profile drag would save a tremendous amount of time in making a design study. With this in mind I have attempted to work up such an expression as follows.

Airfoil Profile Drag

Approximate Formula for Coefficient

$$K_{x\theta} = 0.000015 + 0.001\left(\frac{T}{C} - 2\,\frac{h}{C}\right)^2 + 100\left(\frac{h}{C}\right)^2 + 8\left(K_y - 0.02\,\frac{h}{C}\right)^2$$

For coefficient of total airfoil drag (K_x) should be added

Induced drag coefficient, $K_{xi} = \dfrac{125\,K_y^2}{R}$

Coefficients are for units: lb., sq.ft., and m.p.h.

$\frac{T}{C}$ = Weighted mean ratio of maximum thickness of airfoil section to chord length

$\frac{h}{C}$ = Weighted mean ratio of maximum displacement of median line of section above straight line connecting leading and trailing edges—to chord length. (0.04 is a good compromise figure for wings)

K_y = Lift coefficient

R = Effective aspect ratio $\left(\frac{(Kb)^2}{S}\right)$

Formula applies to best smooth fair airfoils of modern design—at full flight scale.

A portion of the article by Colonel Clark in the October 17, 1927, issue of AVIATION is herewith reprinted:

"An 'adjustable' airfoil section upon which you have the data has been laid down. By manipulation of this basic section—changing thickness or curvature of median line, or both, according to the methods outlined,—an infinite number of sections may be obtained which are affinal. Airfoils tapered in plan or in thickness ratio, or both, can also be constructed and their characteristics predicted. The thickness may be changed to meet the structural demands (wing beam depth, etc.) and the curvature of median line varied to obtain maximum lift coefficient or minimum drag coefficient to meet the performance requirements of a particular design problem. These latter two important characteristics,—important not only of themselves but also because they usually constitute an index of merit for all-round applicability, —have been 'predicted.' It takes a deal of temerity to venture such 'prediction' but after all, for the reason stated, these predictions of full scale characteristics probably will neither be confirmed nor contradicted. If they are no more inaccurate for the purpose of full flight performance calculation than low scale tunnel tests as judged by the National Advisory Committee tests, the adjustable airfoil series may be useful.

"The layout data for the basic section are given in Tables I and II.

"The layout method is shown in Fig. 1. A straight base "line" is first drawn with the desired cord length. Perpendiculars to this line are erected at the stations indicated in Table I and the curved median lines plotted and drawn. Then straight lines are drawn in each case perpendicular to the median line at its point of intersection with the "base" ordinate line and the contour of the section plotted from Table II and drawn.

"If a higher maximum lift coefficient than that for the basic section is desired, at the sacrifice of drag and center of pressure travel, the ordinates from Table I are multiplied by a *constant* factor greater than unity to give the desired characteristics predicted in the chart, Fig. 2. Conversely if low drag or center of pressure travel is more important than high lift for the particular case, the constant factor may be less than unity.

"If deeper spars than may be contained within the basic section are required for strength and rigidity at the sacrifice of drag, the ordinates from Table II are multiplied by a *constant* factor greater than unity, a "fatter" section drawn around the median line selected and its characteristics predicted from Fig. 3.

"Combinations of camber and thickness are infinite."

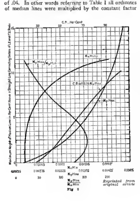


Fig. 2

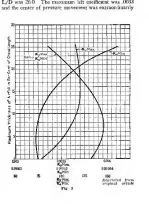


Fig. 3

Ordinates of Median Line. For Maximum Displacement .0600 Chord Length

Distance from leading edge expressed in terms of chord length	025	.05	.075	.10	.15	.20	.30	.40	.50	.60	.70	.80	.90
Ordinates of medium line in terms of chord length	00224	00911	01491	01951	02671	03183	03760	03995	03872	03471	02877	02086	01114

Ordinates at Leading and Trailing Edges are 0

Table I

Reprinted from original article

Half-Thickness Ordinates. For Maximum Thickness .10 Chord Length

Distance from leading edge in terms of chord	025	05	075	10	15	20	30	40	.50	60	.70	.80	.90	1.00
Half-thickness in terms of chord	02191	03016	03582	03996	04539	04856	04985	04722	04236	03593	02836	01988	01077	00119

Table II

Reprinted from original article

NOTES ON THE DESIGN OF THE

N.A.C.A. Cowling

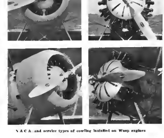
By William H. McAvoy
National Advisory Committee for Aeronautics, Langley Field Va

THE N.A.C.A. type cowling has been applied to many types of aircraft using radial air cooled engines, with varied success. In some installations, the modifications which were made to the N A C A cowling resulted in lowering the cowling efficiency and in improper engine cooling. It is the purpose of this article to present some additional notes on the design of the cowling, calling particular attention to the fact that the nature of the problem is such that, at the present time, no set rules can be followed. This is mainly due to the differences in the detail design of various engines. However, there are certain definite facts which influence the cowling design and must be considered, judgment being exercised in the evaluation of the importance of these facts.

The air which flows over the fuselage of an airplane with an uncowled radial air-cooled engine installation, is quite turbulent because its flow has been disturbed by the irregularity of the engine section. The main idea of the N A C A cowling is to keep a smooth flow of air over the fuselage and at the same time properly cool the engine. The result is an appreciable decrease in the drag of the airplane. The general layout of the N A C A cowling is shown in Fig. 1.

The drag of a fuselage is increased by any projection on its surface which interferes with the smooth flow of air over it, and the drag of a fuselage with an air cooled engine may be reduced and made to approach more nearly the drag of a perfect streamlined body, if the engine is completely covered. Also, the larger the fuselage behind an uncowled radial air cooled engine, the less is the increased drag due to the engine. From the standpoint of drag there is no reason to make the maximum diameter of the fuselage smaller than that of the engine. Cowling is further justified in this connection by the fact that it is necessary for proper cooling, since an uncowled radial air cooled engine gets less air when placed in front of a large fuselage. This is also true if the engine is eccentrically placed with respect to the body behind it, in which case some cylinders will be cooler than others.

It is reasonable to assume that if an air-cooled engine will cool without cowling, then by the use of it and the control of the airflow which it allows, there should be no real difficulty in maintaining the same degree of cooling; in fact it should be better. Before designing the N A C A type cowling to *properly* cool an engine, it is necessary to know the engine operating temperatures and heat characteristics. However, in each case, with a general knowledge of the allowances which should be made by local changes in the cowling to care for such individualities of the engine and installation as exhaust stacks, manifolds, magnetos, valve housings, shape of heads, and local projections behind the cylinders which would hinder the free get-away of cooling air, etc.; a cowling can be designed which will cool and give an increase in speed and be in fair accordance with one developed



N A C A and service types of cowling installed on Wasp engines

in the more costly way using thermocouples. But it must be remembered that overheating of an air-cooled engine is often difficult to detect before damage is done, as it does not always quickly or violently object to the way in which it is installed and may run for quite a long period before inadequate cooling of some part makes itself felt in some form, such as gummed rings on an individual cylinder. Many operators of air-cooled engines assume that the oil temperature indicates engine temperature to the same extent as the water temperature on water-cooled engines does, which is not true. Since the only indication which a pilot has of overheating is either the loss of power, which may be too gradual to notice until damage is done, or an increase in oil temperature, which is little affected by the state of the head. The only sure way to get the best cowling, and one which meets the manufacturers' temperature specifications is to follow a definite schedule for measuring engine temperatures. By closely studying the data thus obtained, the cowling may be modified where necessary. Thermocouples should be placed at as many points on the cylinders as possible, paying special attention to the head and not using any one point as a criterion if representative indications are desired.

Giving due consideration to the foregoing, the actual design of the cowling may be started at the nose. The

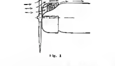


Fig. 1

shape of the nose of the outer cowling is determined by the diameter of the engine, the distance the propeller is forward of the cylinders, a consideration of the flow of air to the engine parts to be cooled; a good entry on the nose to separate the cooling air from that which flows over the fuselage, the shape and size of the body behind the engine to which the cowling must be faired, and a realization that, since it has little effect on speed, there is nothing to be gained in keeping the opening at the nose small to the point where it becomes difficult to get an easy flow with a sufficient amount of air to the cylinder heads. The quantity should be controlled by the size of the exit. A gain in propulsive efficiency is obtained by the use of the cowling, and it is believed to be entirely due to the smooth flow of the air after it leaves the propeller and passes over the outer surface of the outer cowling near the nose.

To locate the point from which to lay out the shape of the nose of the outer cowling, past experience and a study of conventional engines indicate the following rule, which is illustrated in Fig. 2. Through the center line of the cylinders at their maximum diameter draw a line (1) forward to the propeller plane and which, if extended, would intersect the center line of the crankshaft ahead of the propeller at an angle of 30 deg. Allowing clearance, the line (2) may be drawn perpendicular to the crankshaft showing the limit of the forward position of the nose. Through the intersection of these two lines (1) and (2), draw another (3) parallel to the crankshaft. There are now two lines, (2) and (3); (2) limiting the forward position and (3) the size of opening in the nose of the cowling. The curve of the nose may now be drawn tangent to these two lines, as is shown by the accompanying sketch. The inner line of the outer cowling should be so designed as to allow the cooling air free passage over the top of the cylinder head.

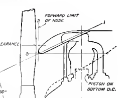


Fig. 2

The inner cowling is, in effect, a deflector. It is very important and must not be omitted. The inner cowling and the inner lines of the outer cowling, together with vertical deflectors placed between the cylinders, are used to direct the airflow where needed. The air passage through the cowling, from the nose to the exit, should permit an easy flow, diverting the air as little as possible from the direction of flight and still directing it to the hot parts of the cylinder as nearly parallel to the cooling fins as is practicable. The point of intersection of the lines of the inner cowling with the center line of the cylinders should be at about the top of the piston when the latter is on bottom dead center, and from this point the cowling is faired both into the nose at the crankcase, and into the opening at the rear. The vertical deflectors share with the rear opening in controlling the quantity of airflow and should be considered together. The deflectors should be designed and placed to make *all* the air which flows into the nose do work in cooling and not allow it to flow freely through the spaces between the cylinders without coming in contact with them. Figure 3 gives an idea of the location of the vertical deflectors. The success of the deflectors is due to their using less air to better advantage than can be done without them, and thus allowing the opening at the rear to be reduced. It might be well to mention here that, since the deflectors determine the path of the air and the exit opening determines the quantity, by properly proportioning and changing the opening, variations in cooling may be obtained for seasonal flight conditions and the engine operating temperatures kept fairly constant regardless of air temperatures. Thus, the generally known advantages of the air cooled engine in extremes of climate which have been borne out from actual experience are enhanced

by the use of the cowling So far, nothing has been said of the crankcase other than that it is completely cowled The crankcase has to deal with a certain portion of the cylinder heat which it gets from the oil, the amount depending on whether the cylinder heads are

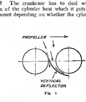


Fig 3

well or badly cooled The better the cylinder cooling, the less the need for crankcase cooling, and as yet, we have not found it necessary to make provision for it However, if it should be necessary, it could well be taken care of by an oil cooler and, since it appears that in the future oil coolers will be used on air-cooled engines, the problem should present no difficulties and could be cared for without appreciably altering the design of the cowling.

Flight tests have shown the opening at the rear to be the most critical point in the cowling design and tests are now being conducted to obtain more information concerning it It is known that closing the exit tends to increase the speed of the airplane, but also to reduce effective cooling Since it is still in the cut and try stage of development, it might be well to mention that for a 200 hp engine, an opening of 380 sq.in has proven sufficient when deflectors of the type indicated are used To apply this to any other engine, it is believed that the area may be changed in direct ratio to engine powers, but this figure should not be too closely approached until evidence is obtained of satisfactory engine temperatures proving the deflectors and the balance of the cowling to be efficient The distance the opening is placed back of the engine also seems important, since it determines the angle and manner in which the cooling air re-enters the outside air. It is believed that it should do so nearly tangentially with a reasonable length of opening, but further work is necessary to accurately fix the limits of the angle of re-entry and the size of the opening It is also indefinite as to whether the nose cowling lines extended should fair into the fuselage or extend outside and parallel to it, as shown by Figure 4.

The Hornet powered Boeing Transport Model 80-A showing the low drag cowling installations

The cowling has other possible advantages, some of which should make it attractive to engine designers. There are details such as overhead valve gear, for instance, which are limited in their complications of design for better efficiency because of their increased drag, and which are no longer a problem when the engine is completely cowled.

The cowling may be used as a carburetor air heater, depending upon whether the intake air scoop draws air from the outside of the cowling or from the inside where it is heated by having passed over the cylinders Any air used from the inside of the cowling decreases the size of the exit with its known resultant advantages With the scoop inside the cowling, there is less possibility

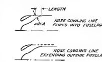


Fig 4

of sucking sand and dirt, and in the case of seaplanes, water, into the carburetor Also, with the engine completely enclosed as it is, there will be a beneficial heating effect on the carburetor and intake manifolds There is a further possibility that the air heated by the cylinders and such exhaust piping as may be inside the cowling may be utilized to heat cockpits, cabins, etc Anything which will contribute to the heat of the cooling air should be kept behind the cylinders so as not to interfere with the coldest air reaching the cylinders, but the exhaust manifold may be placed in the nose of the outer cowling providing the air which cools it is insulated from that which cools the engine.

Experience with one installation indicates that the cowling may be used to advantage in radio work, since in that case it effectively shielded ignition noises, and shielding of the spark plugs was unnecessary

It seems much easier to incorporate the N A C A. cowling in the original design of an airplane than to adapt it to those already in service The latter condition imposes far more limitations on the extent to which the design may be followed Many modifications of the original N A C.A cowling may be necessary, for the effect of the cowling depends upon its *degree of refinement* One installation has been made with no inner cowling and the outer cowling modified to a plain band around the engine over the cylinder heads However, any cowling which holds the air to the cylinders and also tends to straighten its disturbed flow around the engine and fuselage is a step in the right direction.

Heat Flow IN AIRCRAFT ENGINE *Pistons*

By C. F. Taylor, M.E., and M. S. Huckle, S.B.
Massachusetts Institute of Technology

THE subject of heat flow in the pistons of high performance internal combustion engines is of great importance since it largely controls piston temperature. The piston temperature, in turn, is an important factor affecting not only the strength and life of the piston itself, but also such essential characteristics as the maximum compression ratio which may be used with a given fuel and the extent of the cyclic heat losses, friction losses, etc It is therefore evident that considerations of heat flow should be given an important place in piston design

Many previous investigations concerning heat flow in pistons, and piston temperatures have been made, both under actual running conditions in an engine[1] and in special apparatus designed to simulate engine conditions.[2] None of these investigations, however, seems to have included any determination of the amount of heat leaving the piston by convection to the air and vapor in the crankcase, which appeared to the authors as a factor of possibly considerable importance, and was the chief object of this investigation

Method of Attack

After a careful study of various possible methods of making such a determination, the use of an engine in actual operation was ruled out as involving too many technical difficulties The apparatus finally decided upon was a modification of that used by Huebotter and Young Such an apparatus is obviously incapable of an accurate reproduction of engine conditions, but it was believed that the tendencies shown by means of such equipment would be of considerable interest, and might be usefully interpreted for purposes of piston design The apparatus was constructed and the tests were made by T E Doherty[3] M S, to furnish data for a thesis at the Massachusetts Institute of Technology

Description of Apparatus

The apparatus hereinafter described, Fig 1, is designed to simulate engine conditions as closely as possible while admitting of reasonably accurate measurement of

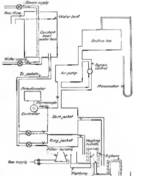


Fig 1

heat flow It is difficult to evaluate, and impossible to simulate, the cooling effect of the crankcase air on the under side of the piston While the mass flow of air through the crankcase is small and the air is probably at a relatively high temperature, its capacity to abstract heat from the piston is augmented by entrained oil particles and by its very rapid agitation Rather than attempt to simulate such conditions, certain arbitrary quantities of air were circulated past the under side of the piston The heat so abstracted was measured and the effect upon heat flow and piston temperatures noted It was felt that this would give at least a qualitative idea of the possible cooling effect of the crankcase gases as well as the effect of piston design on the relative amount of cooling by the crankcase gases

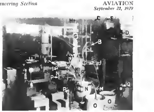
Fig, 2 is a cross section of the testing unit The

[1]Some important investigations of this type are
"A C Studies Heat Effects on Aluminum Alloy Pistons." Ralph N DuBois, Automotive Industries, Jan. 19, 1929
"Method of Measuring Temperature of Pistons." Report of Power Plant Branch of Materiel Division of Army Air Corps No 2825, June 25, 1927
"Piston Temperatures in Aero Engines." Royal Aircraft Establishment Inter-departmental Report No. 1333 A H Gibson, D Sc.
"Distribution and Variation of Temperature in the Cylinder and Piston of an Aircraft Engine" Suhara and Sato Vol 1, No 5 Report of the Aero Research Institute Tokio Imperial University
[2]"Flow of Heat in Pistons." H. A. Huebotter and G A Young, Bulletin No 25 Engineering Experiment Station of Purdue University, December, 1925
[3]Engineer, Transcontinental Air Transport, Inc

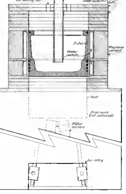
piston to be tested was placed within a special steel cylinder, constructed of seamless steel tubing turned and ground to the correct internal diameter. The cylinder was made in two sections, one section extending from the head of the piston to a point just beyond the lowest head ring, and the second covering the rest of the piston skirt. An asbestos board filler plate was fitted between the two parts, providing an air gap of $\frac{1}{32}$ in. on the inside surface of the cylinder. Each section was fitted with a separate water jacket and insulated thermally from the other as thoroughly as the available space would permit. The two sections were held between end plates of asbestos by through bolts and the whole assembly lagged with magnesia cement to a minimum thickness of one inch. One end of this cylinder, that corresponding to the head-end of the piston, was open for connection to the heating unit while the other end was closed by an asbestos plate, in which passages for circulation of air were provided.

Heat Furnished by Burners

The testing unit was placed over a furnace with the head of the piston down. Heat was supplied by means of two Meker burners using gas from the city mains. The burners were so mounted in the furnace that the flames converged toward the center of the piston head. The furnace, of plain red brick, was built up without mortar to resemble a short section of a small chimney with a square top opening whose width slightly exceeded the diameter of the pistons. This opening was covered with $\frac{1}{4}$ in. layers of asbestos board containing concentric circular holes slightly smaller in diameter than the piston. Air entered the furnace through an opening at the bottom of the front side and the gases were vented through the similar opening at the top of the rear side, under a metal screen shielded on top by a sheet of asbestos. A small electric fan provided a draft through the furnace in the desired direction.



A photograph of the apparatus used in the tests. A—cylinders. B—Water inlet control. C—Thermostat switch. D—Potentiometer. E—Manometer. F—Orifice box. G—Air uptake. H—Air thermometer. I—Water inlet thermometers. J—Water outlet thermometer. K—Water outlet tubes. L—Water inlet tubes. M—Water siphons. N—Water receiving buckets. O—Water removal buckets. P—Water scales. Q—Furnace fan. R—Furnace. S—Furnace vent screen. T—Pump. U—Air driving motor. V—Skirt jacket. W—Ring jacket.



Cooling water entered at the bottom of the jacket of each cylinder section and passed around it, to leave at the top. The temperature of the water was measured as it entered each jacket and again as it left. The amount of water passing through each jacket was controlled by a needle valve, and the exit water was collected in two separate buckets, on separate scales. The water was supplied by gravity from a constant head tank in which it was kept at 160 deg. F. by having low pressure steam blown through it.

Crankcase Gas Cooling Simulated

The cooling air to simulate the cooling effect of the crankcase gases was drawn through holes in the top plate of the unit and out through a one-inch pipe, which cleared the bottom of the piston about one inch, to the intake of a Beach-Russ vane type air pump, driven by an electric motor. The delivery of the pump was passed through an orifice box, the pressure in which was read by a manometer. Control of the air flow was obtained by by-passing the delivery of the pump back to the intake through a three-quarter inch pipe. The pipe leading out of the cylinder was lagged for the first two and one half feet of its length, at the end of which a tee provided entry for a thermometer. The distance from the piston to the thermometer reduced the error due to direct radiation from the piston to the thermometer.

The temperatures in the piston were measured by means of eleven iron-constantan thermocouples located as shown in the plots. Each wire was inserted in a hole drilled in the piston with a No. 57 drill, the end of the wire inserted in the hole and the metal peened back into the hole to grip the wire. The two holes for each pair of wires forming a thermocouple were located not more than $\frac{1}{16}$ in. apart.

In both pistons some of the thermocouples had to be gripped from the inside and some from the outside of the piston due to mechanical limitations. It was intended that each wire make its contact at the inside surface and while this probably did not occur in all cases, for the sake of uniformity it was assumed to have done so and is so shown on the plots (Figs. 3 and 4). The error so introduced would be at a maximum, equal to the comparatively small temperature gradient through the piston wall.

Readings of temperature were taken with a Leeds and Northrup potentiometer provided with an automatic cold junction and calibrated to read directly in degrees Fahrenheit.

Two pistons were tested: No. 1, Fig. 5, from the Wright J-4B engine, a one piece casting of aluminum alloy (9 per cent Cu, 92 per cent Al) unribbed with four rings above the wrist pin and one at the bottom of the skirt, and No. 2, Figs. 6, 7 and 8, from the Wright J-5 engine, a one piece casting of the British "Y" alloy, with two arched ribs extending to the bottom of the skirt and two smaller ribs meeting the inside end of the wrist pin bosses, all in planes perpendicular to the axis of the wrist pin. This piston carried three rings above the wrist pin, the lowest of these being an oil scraper with drain holes drilled in a deep oil groove in the piston wall just below the ring, and one ring at the bottom of the skirt. Shallow circumferential oil grooves were turned in the piston skirt.

The sectional views of these pistons, Figs. 5 to 8 inclusive, are drawn to three-quarter scale, but for clearness and simplicity are not dimensioned, the purpose being to show the relative proportions of the various parts rather than their exact sizes.

Method of Making Tests

A series of five tests was made on each of the two pistons that were used in conducting these experiments:

(1) Without oil in piston and without cooling air circulation
(2) With oil and without air
(3) With oil and minimum air flow
(4) With oil and medium air flow
(5) With oil and maximum air flow

The variation in the air flow was obtained by means of the by-pass control previously mentioned. "Minimum" air flow occurred with the by-pass wide open; "maximum" air flow with the by-pass completely shut and "medium" flow at a pressure in the orifice box approximately half way between the extreme pressures.

Piston Temperatures

The temperatures, read by means of the thermocouples, are plotted against thermocouple location, in Figs. 3 and 4 for Pistons Nos. 1 and 2 respectively, for the various conditions of testing. Due to the error of thermocouple contact location discussed elsewhere in this report, these points cannot be considered exactly at the piston surface.

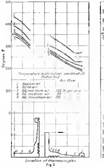


Fig. 3

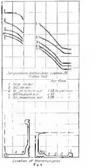
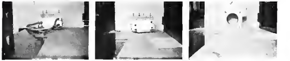


Fig. 4



Left—Water jacket assembly showing thermometers, water tubes and lap'rover. Center—Detail showing lagging and hose connections. Right—Top view.

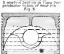
The curves are valuable only as a general indication of the temperature conditions to be found in the pistons

The comparatively large drop in temperature upon the use of oil on the cylinder walls, is accounted for by the fact that the heat conductivity of oil at the temperature of the test is approximately seven times that of air This allows the cooling system to work more efficiently by providing a better medium of heat transfer between the piston and cylinder wall It was anticipated that, due to the absence of piston motion during the test, the oil would collect by gravity in the ring belt That this actually occurred is shown by the fact that the largest temperature difference between the oiled and dry condition occurred at the ring belt where the oil completely filled the clearance

In an operating engine, the distribution of the oil

Piston No 1 J4B
Diametral Section in Plane Perpendicular to Axis of Wrist Pin
Fig 5

Piston No 2 J5
Plan of Interior
Fig 7



Piston No 2 J5
Diametral Section in Plane Perpendicular to Axis of Wrist Pin
Fig 6

Piston No 2 J5
Diametral Section in Plane of Axis of Wrist Pin
Fig 8

would be more uniform, though it is doubtful if there would be enough oil to completely fill the clearances Therefore, this effect might be diminished and the resultant would probably be somewhere between the conditions with and without oil

The effect of the ribs in Piston No. 2 seems to be a flattening of the head temperature curve and a steepening of the skirt curve. Slightly higher temperatures were obtained with the ribbed piston for all conditions except condition No 5, with oil and maximum air flow This piston is of lighter section throughout than No 1 and the direct contribution of the ribs to cooling becomes apparent only with the use of the internal air blast The smaller number of rings and smaller quantity of material in the ring belt are causes contributing to the higher temperature found in the ring belt of the ribbed piston The determination of the relative effect of the smaller sections and of the ribs lies beyond the scope of these tests

Distribution of Heat Removed

A plot of B.t.u.'s per minute removed through rings, skirt and air blast is given in Fig 9 It is evident from the decrease in piston temperatures that the addition of oil to the cylinder walls must have increased the heat flow through the piston The fact that this was not indicated in the case of piston No 2 (ribbed) is undoubtedly due to experimental error Possibly the rate of gas flow to the burners may have varied It could be desirable to construct the heating element of the apparatus so that, within reasonable limits, the temperature at the center of the piston head could be held constant regardless of the method of cooling employed

In Fig 10, the heat dissipated through the various channels, is plotted on a percentage basis This shows more clearly the effect of the various rates of air flow and the practically negligible effect of the oil as regards changing the distribution of heat removal between rings and skirt

Probable Errors

Thermocouples were not calibrated against a standard as their only purpose was to indicate the relative temperatures existing in the various parts of the piston Their exact point of contact could not be definitely ascertained, as was stated above, so that calibration would have fallen within the experiment error

The error in timing the tipping of the beam on the water scales was estimated to be one second at a maximum, giving a probable error of from 0 8 per cent to 3 5 per cent in this reading

Thermometers were calibrated and found to be correct within ½ deg F, and the mean value of several readings was used in the tables

Radiation loss through the lagging was determined by experiment to be 5 per cent of the total heat dissipated through the jackets This error should have remained approximately constant for all runs, and therefore have had little effect on the comparative value of the results

The error in air flow measurement was small, as a calibrated orifice was used and correction made for temperature and barometric pressure

Other errors, such as radiation to thermometers, variation in gas flow to the burners and miscellaneous heat losses probably accounted for an appreciable error

Left—Pistons with thermocouple leads (No 1 at left) Center—Top view of pistons (No 1 at left). Right—Photograph showing method of mounting burners to provide converging flame.

in the measurements of total heat flow The error indicated by the reversal of the relative position of the curves No 1 and No 2 in Fig 9 is 20 per cent at its maximum Percentage distribution of heat flow as given in Fig 10, however, is a much more valuable figure than the absolute quantities, and the errors in Fig 10 are believed to be small

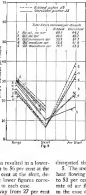


Fig 9

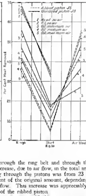


Fig 10

Conclusions

Within the limited range of temperatures and with the two types of aluminum alloy piston used the following conclusions may be made

1 Without any air flow inside the pistons between 65 per cent and 68 per cent of the heat dissipated goes out through the ring belt and 32 per cent to 35 per cent through the skirt

2 The forced flow of fresh air over the inside of the piston resulted in a lowering of these figures from 35 per cent to 56 per cent at the ring belt and 4½ per cent to 18 per cent at the skirt, depending on the rate of air flow, the lower figures corresponding to the maximum air flow in each case

3 The forced air flow carried away from 27 per cent to 55 5 per cent of the total heat dissipated from the pistons, depending on the amount of air flow and the design of the piston the ribbed piston dissipating 43 5 per cent to 55 5 per cent and the unribbed one dissipating 27 per cent to 48 per cent to the air

4 The presence of a film of oil on the cylinder walls has no great effect on the relative amounts of heat dissipated through the ring belt and through the skirt

5 The increase, due to air flow, in the total amount of heat flowing through the pistons was from 23 per cent to 53 per cent of the original amount, depending on the rate of air flow This increase was appreciably greater in the case of the ribbed piston

Further investigations with this apparatus are planned, with a view toward comparing pistons with wider variations in design An attempt will be made to measure the cooling effect of the crankcase gases in an actual engine, and this result will be used as a criterion to establish the rate of air flow in this apparatus so that it will more nearly approximate engine conditions

TECHNICAL REVIEWS

N A C A Technical Note No 316 Wind Tunnel Tests On a Model of a Monoplane Wing With Floating Ailerons, by Montgomery Knight and Millard J Bomber

This report describes preliminary wind tunnel tests on a model of a monoplane wing equipped with wing tip floating ailerons Lift and drag, as well as rolling and yawing moments, were measured

The rolling moments were roughly independent of angle of attack and the yawing moments were small With the ailerons neutral the minimum drag was more than twice that of the wing without ailerons

N A C A Technical Report No 311, Aerodynamic Theory and Test of Strut Forms, by R H Smith

The whole study under this title is in two parts, only the first of which is reported here In this part the symmetrical inviscid flow about an empirical strut of high service merit is found by both the Rankine and the Joukowsky methods The results can be made to agree as closely as wished Theoretical stream surfaces as well as surfaces of constant speed and pressure in the fluid about the strut are found The surface pressure computed from the two theories agrees well with the measured pressure on the fore part of the model but not so well on the after part From the theoretical flow speed the surface friction is computed by an empirical formula The drag integrated from the friction and measured pressure closely equals the whole measured drag As the pressure drag and the whole drag are accurately determined, the friction formula also appears trustworthy for such fair shapes

The Gluing of Wood, by T R Truax, Senior Wood Technologist, Forest Products Laboratory, Branch of Research, Forest Service

The purpose of this publication is to bring together essential information about glues and gluing, to set forth important principles of control in the gluing operation, and to outline methods that have been found to give satisfactory results

ANALYSIS OF THE *Wing* AND OTHER *Indeterminate Structures*

By JEAN FRADISS and ARMAND THIEBLOT
Fokker Aircraft Corp

PART IV

IN THE last article we gave a method for computing the loads in the spars of a wing considered as an indeterminate structure We calculated the reactions of the compression members on the spars and found the true value of their bending moment We will now end the calculation of this conventional type of wing structure by determining the loads in the compression members

The problem which consists of analyzing a wing structure considered as an indeterminate system in the general case, i.e. when the external forces acting on the system are a resultant force passing through the elastic center and a torsional moment—is a problem without a general solution On the contrary a particular method must be used for each particular case

Nevertheless, the interaction of the spars through the compression members depends upon the rigidity of the spars in torsion, it is obvious that each spar does not remain parallel with itself as it deflects but has a tendency to rotate and the magnitude of this movement will affect the deflection of the spars as well as the bending moment in the compression members—as shown in Figures 1, 2 and 3

Fig 1

Fig 1 shows the undeflected basic structure formed by the spars S_1, S_2, and the compression member M

Fig 2 is a fictitious picture of the same structure when the spars have deflected in such a manner that they remain parallel with their original position

Fig 3 gives a true view of the system after deflection The resultant deflection of the spar and the bending moment in the compression members are a function of the torsional rigidity of the spar and of the elasticity of the compression member

But the spar cross-sections generally adopted (irregular shape and often not homogeneous) do not permit the computation of the value of the torsional deflection of the spars and therefore the true magnitude of the bending moment in the compression members

Fig 2

Hence it can be seen that the calculations of the bending moment in the spars made according to the method outlined in the last article are obviously on the conservative side it was shown that if the spars were calculated in accordance with standard practice in such a manner that their margin of safety is equal to zero, actually in most cases they have a positive margin

The calculation of the compression members neglecting the torsional deflection of the spars is also conservative since we suppose that the moments M (Fig 4) are entirely absorbed by bending in the drag member instead of being relieved by the spars in torsion

But the rigidity of the spars in torsion is generally so much greater than the rigidity of the compression members in bending that the following computations based on the above assumption give the loads in these members with reasonable accuracy

For the same reason in the last article the presence of the compression members was not taken into account in writing the equation of least work, and the spars were considered alone

We will demonstrate that if the factor due to the torsional moment had been taken into consideration in the equation of least work, it would only have proved that the magnitude of the moment M is such that it balances the vertical reactions Z of the compression members on the spars

Let us call T the total work of the entire system spar and compression members The derivative of T with respect to the torsional moment for the spar equals zero since we have neglected the torsional deflectional of the spar We have for the compression members

$$T_t = \sum_{o}^{n} \int_{o}^{L} \frac{M^2}{2EI}\, dx$$

where n is the number of compression members, L is the length of the compression members and M the bending moment in the compression members

The expression for the bending moment in the compression member is

$$M_x = Zx - M$$

therefore we have

$$T_1 = \int_{o}^{L} \frac{(Zx - M)^2}{2EI}\, dx$$

whence:

$$\frac{\delta T_1}{\delta M} = -\int_{o}^{L} \frac{Zx - M}{EI}\, dx$$

integrating:

$$-\frac{ZL^2}{2EI} + \frac{ML}{EI} = 0$$

and:

$$M = \frac{ZL}{2}$$

which proves that the moment due to the fixed end, M at each spar is equal to the moment of the vertical reaction Z acting at the other end of the compression member

Therefore the vertical reactions, that we have calculated in the previous article permitting the computations of the moments M give all the elements necessary to compute the loads in the compression members These members should be treated as beams in bending and compression due to the drag loads

Analysis of a Wing with a Rigid Covering

In a wing having a rigid covering, the compression members are generally omitted, consequently the loads acting on the spars may be determined by a consideration of elastic center as previously outlined The torsional moment is taken partly by the spars and partly by the rigid covering The problem consisted of finding the maximum stress acting in the covering for a given torsional moment That is, in most cases, the torsional moment given by the nose dive condition This moment is found by multiplying the shearing forces on front and rear spars by their respective distances to the elastic center and adding the results This is done in the same manner as for compression members, for a certain number of stations taken along the span beginning at the wing tip The increase of torsional moment is calculated for the station considered and added to that of the former station

The problem considered as a whole, that is the wing structure taken as a four wall box beam, the walls being interconnected by the ribs (Fig 4) and submitted to any loading, does not yet admit of a practical solution However, a good approximation might be found by a mathematical interpretation of the results of tests

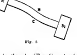


Fig 3

The method for computing the stresses in such a wing structure, given below is based solely upon the fact that the results obtained are closely enough in agreement with the experimental data With a plywood covering calculated for a shearing stress of 800 to 1,000 lb per sq in., it has been found that the compressive or tensile stresses are not critical and furthermore that they relieve the spars of a certain part of their load In the low angle of attack loading condition this relieving factor is generally about 20 per cent

For the other conditions this factor varies as the ratio of the torsional moments i.e. as the product of the resultant airload by the distance from the center of pressure to the elastic center The shearing stress in the wing covering due to the torsional moment can be calculated with a sufficient degree of accuracy by means of St.-Venant's formula

$$= \frac{M_t}{2Ft_e}$$

Where F is the inner cross-sectional area and t_e the wall thickness This stress added to the shearing stress due to the chord load will give the total shearing stress in the covering

The numerical calculations are carried out in the same manner as those given in the previous analysis

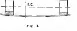


Fig 4

First the spar is considered alone and its cross-section determined for a zero margin of safety Second the plywood covering is calculated for the shearing forces and torsional moments as indicated above

It appears that the spars of a wing calculated by this method will have a positive margin between 15 per cent and 25 per cent

(The authors are indebted to the Fokker Aircraft Corp for the use of the above example.)

PATENTS ISSUED

Patent No. 1,726,439. Seaplane Float. Boris V. Korvin-Kroukovsky, New York, N. Y., assignor to Edo Aircraft Corp., College Point, L. I., N. Y. Four claims.

A seaplane float of the V-bottom class having a transverse step not far from the center of gravity, each side of the bottom being shaped with a few large scallops which extend longitudinally from a region near the stem rearward to the transverse step, said scallops exhibiting in cross section a series of broad and shallow inward curves extending between the keel and the chine and separated from each other by substantially sharp or narrow ridges, the scallops being adapted to throw water sideways and downward with consequent formation of air gaps in the scallops as the result of water breaking off the ridges at high planing speed, whereby to reduce frictional resistance during take-off, the slope of the scallops outward away from the ridges being such as to keep the water from breaking off the ridges at low speed while the float is getting on the step.

Patent No. 1,726,118. Method of and Means for Controlling Airplanes. Frederick Handley Page, London, England, assignor to Handley Page, Limited, London, England. Seven claims.

In laterally controlling aeroplane flying machines, having wings projecting laterally from opposite sides of a central fuselage, said wings having forwardly located auxiliary wings separated from the main wings to produce through slots, means for regulating the flow of air passing through said slots in said wings, ailerons pivotally connected at the rear of said main wings, and means in operative connection with said ailerons and said means for regulating the flow of air passing through said slots to render the latter effective when said ailerons are lifted above normal angles.

Patent No. 1,724,009. Rigid Airship With Separate Gas Cells. Hugo Eckener, Friedrichshafen-on-the-Bodensee, Germany, assignor to Luftschiffbau Zeppelin Gesellschaft mit beschrankter Haftung, Friedrichshafen-on-the-Bodensee, Germany. Three claims.

An airship comprising a cell filled with a non-inflammable carrying gas, another cell filled with inflammable gas, a collapsible cell within said latter cell communicating with said former cell and means connected with said latter cell for allowing the escape of inflammable gas therefrom.

Patent No. 1,724,110. Aircraft. Elliott G. Reid, Hampton, Va. Eight claims.

In combination, a body designed to create by its motion through a fluid, forces having components perpendicular to the direction of motion, and fins secured to said body in planes substantially perpendicular to the main cross stream dimension of the said body, said fins having portions extending above and below said body to dimensions which are at any point substantially proportional to the difference between the pressure at that point and the pressure of the undisturbed fluid.

Patent No. 1,724,890. Mooring Means for Airships. Ralph H. Upson, Detroit, Michigan, assignor to Aircraft Development Corporation, Detroit, Michigan. Eight claims.

Airship mooring equipment comprising a ground post with attaching means substantially flush with the surrounding ground and means adapted to depress the post elevation, a turn-table position about said post and two circular tracks about said post as a center, having ship ground gear associated to resist load and lift and adapted to float with the ship and the bow mooring.

Patent No. 1,725,914. Device for Propelling Aircraft at High Altitudes by Direct Fluid Reaction. Edison Hollowell, Horsforth, near Leeds, England. Eight claims.

Patent No. 1,723,666. Pusher Airplane. Carl G. Thompson, St. Louis, Mo. Seventeen claims.

Patent No. 1,723,763. Airplane. Vincent J. Burnelli, New York, N. Y. One claim.

Patent No. 1,723,778. Airplane. Randolph F. Hall, Ithaca, N. Y., assignor of one-fourth to Theodore F. Hall, Wallingford, Conn., and one-fourth to Paul Wilson, Ithaca, N. Y. Nineteen claims.

Patent No. 1,723,002. Aircraft Engine Mount. Harold Caminez, Garden City, N. Y., assignor to Fairchild-Caminez Engine Corp., New York, N. Y. Eleven claims.

Patent No. 1,723,175. Master Connecting Rod for Radial-Cylinder Engines. Edward T. Jones, Ridgewood, N. J., assignor to Wright Aeronautical Corp. Five claims.

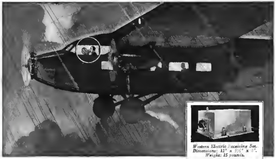
Patent No. 1,723,925. Airplane-Propelling Means. Sherman Mills Fairchild, New York, N. Y. Six claims.

Patent No. 1,723,963. Airplane Shock Absorber. Frederick R. Weymouth, Hempstead, N. Y., assignor to Fairchild Airplane Mfg. Corp., New York, N. Y. Sixteen claims.

Thirteen Designs Receive Department A.T.C.

During the period of 30 days, August 21 to September 21, thirteen designs have received Airworthiness Type Certificates issued by the Aeronautics Branch, Department of Commerce. The addition of the newly licensed thirteen brings the total of licensed planes up to 222. The designs granted certificates during the 30 day period are products of General, Boeing, Stinson, Curtiss, Curtiss-Robertson, Command-Aire, Kreider-Reisner, New Standard, Loening and Fokker.

Complete specifications of new designs will be found in the supplement of the Aeronautical Engineering Section.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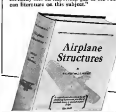
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"	"	"	5	NC4755	J5 Whirlwind	106 hrs.	5,100.00—	Valley Stream*
"	"	"	5	NC4756	J5 Whirlwind	82 hrs.	5,600.00—	
"	"	"	5	C5885	J5 Whirlwind		5,900.00—	Baltimore
Fleet Husky Jr.	Bi.	Open	2	NC8015	Warner Scarab		4,800.00—	Okla. City
American Eagle	"	"	3	C2712	Oxx6	90 hrs.	2,175.00—	"
" "	"	"	3	C4632	Ox5	60 hrs.	1,950.00—	" "
" "	"	"	3	C5452	Kinner J5	36 hrs.	3,550.00—	" "
" "	"	"	3	C5992	Niam	146 hrs.	2,550.00—	" "
" "	"	"	3	C7581	Ox5	60 hrs. (since overhaul)	1,850.00—	" "
" "	"	"	3	C7173	Ox5	60 hrs.	1,950.00—	" "
" "	"	"	3	C7762	Ox5	25 hrs. (since overhaul)	1,950.00—	" "
Travelair	"	"	3	C7160	Oxx5		1,600.00—	Boston
"	"	"	3	C3747	Ox5		2,200.00—	"
"	"	"	3	NC4651	Ox5		2,100.00—	Moline, Ill.
"	"	"	3	6015	Ox5	1 hr.	3,200.00—	Boston
"	"	"	3	C8295	Ox5	113 hrs.	1,700.00—	Bridgeport
"	Mono.	Cabin	5	NC6470	J5B Whirlwind		8,600.00—	Moline, Ill.
"	Bi.	Open	3	C9029	Ox5	383 hrs.	1,450.00—	Miami
"	"	"	3	C9030	Ox5	403 hrs.	1,300.00—	Valley Stream*
Lincoln Page	"	"	3	C11916	Ox5		1,350.00—	San Francisco
Stinson	"	"	3	NC2779	J4 (Without engine)		3,500.00—	Boston
"	"	"	3	NC3705	J4 (without engine)		3,500.00—	"
Mono. Prep	Mono.	"	2	8920	Velie M5		2,000.00—	Baltimore
Monocoupe	"	Cabin	2	5725	Velie M5		1,700.00—	Louisville
"	"	"	2	C6547	Velie M5		1,700.00—	Baltimore
"	"	"	2	C6987	Velie M5	New plane —never set up	2,000.00—	"
"	"	"	2	C7011	Velie M5		1,950.00—	"
"	"	"	2	C805	Velie M5		1,800.00—	Memphis
"	"	"	2	C6557	Velie M5	B 28 hrs. F 189 hrs. Rebuilt by Factory	1,600.00—	Okla. City
"	"	"	2	C0733	Velie M5		1,000.00—	Baltimore
"	"	"	2	C7335	Velie M5	133 hrs.	1,875.00—	Okla. City
"	"	"	2	C7813	Velie M5	36 hrs.	1,850.00—	
Fairchild	"	"	5	NC32	Challenger		5,000.00—	Bridgeport
"	"	"	5	4440	J5 Whirlwind		6,500.00—	Louisville
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"	"	"	5	NC5643	J5A Whirlwind		7,200.00—	Kansas City
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"	"	"	5	NC5458	J5C Whirlwind		7,500.00—	Boston
Travelair	Bi.	Open	3	NC5302	Ox5		1,800.00—	Bridgeport
"	"	"	3	6037	Hisso		2,900.00—	Louisville
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"	"	"	3	C8149	Hisso		2,800.00—	Baltimore
"	"	"	3	NC1440	Oxx6 (Without engine)		1,200.00—	Boston
					(With engine)		1,500.00—	
"	"	"	3	NC8012	Oxx6		2,200.00—	Hartford
"	"	"	3	NC6078	Oxx6		2,200.00—	Boston
Ireland Neptune Flying Boat	"	"	5	NC4667	J5 Whirlwind		12,000.00—	27 West 57th St., N. Y. C.
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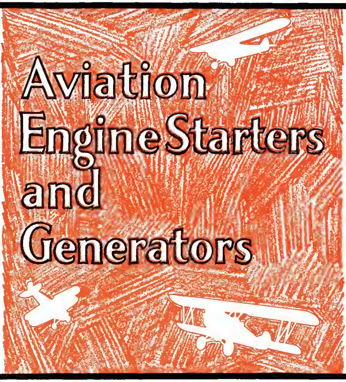

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